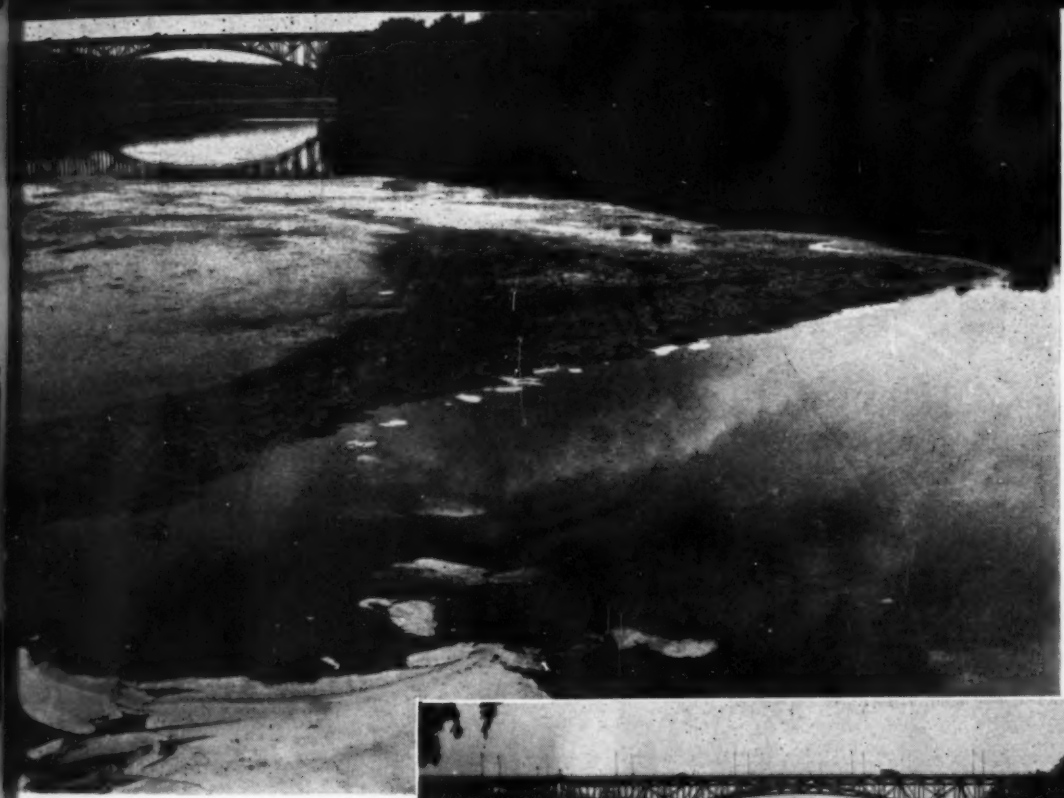
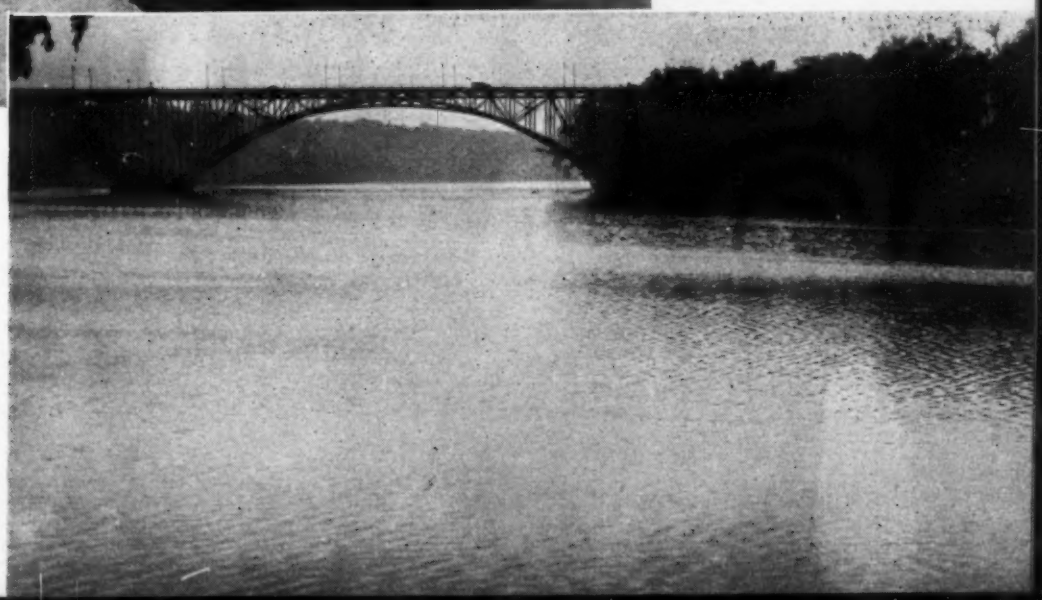
WATER WORKS & SEWERAGE



THE "FATHER OF WATERS"

How the Twin Cities Treated a Magnificent Waterway Before Sewage Treatment.



A DIFFERENT MISSISSIPPI

After the First Summer of Treatment, a Stream Once Again Fit for Recreation

YOU GET THESE 3 ADVANTAGES

with Chapman Standard

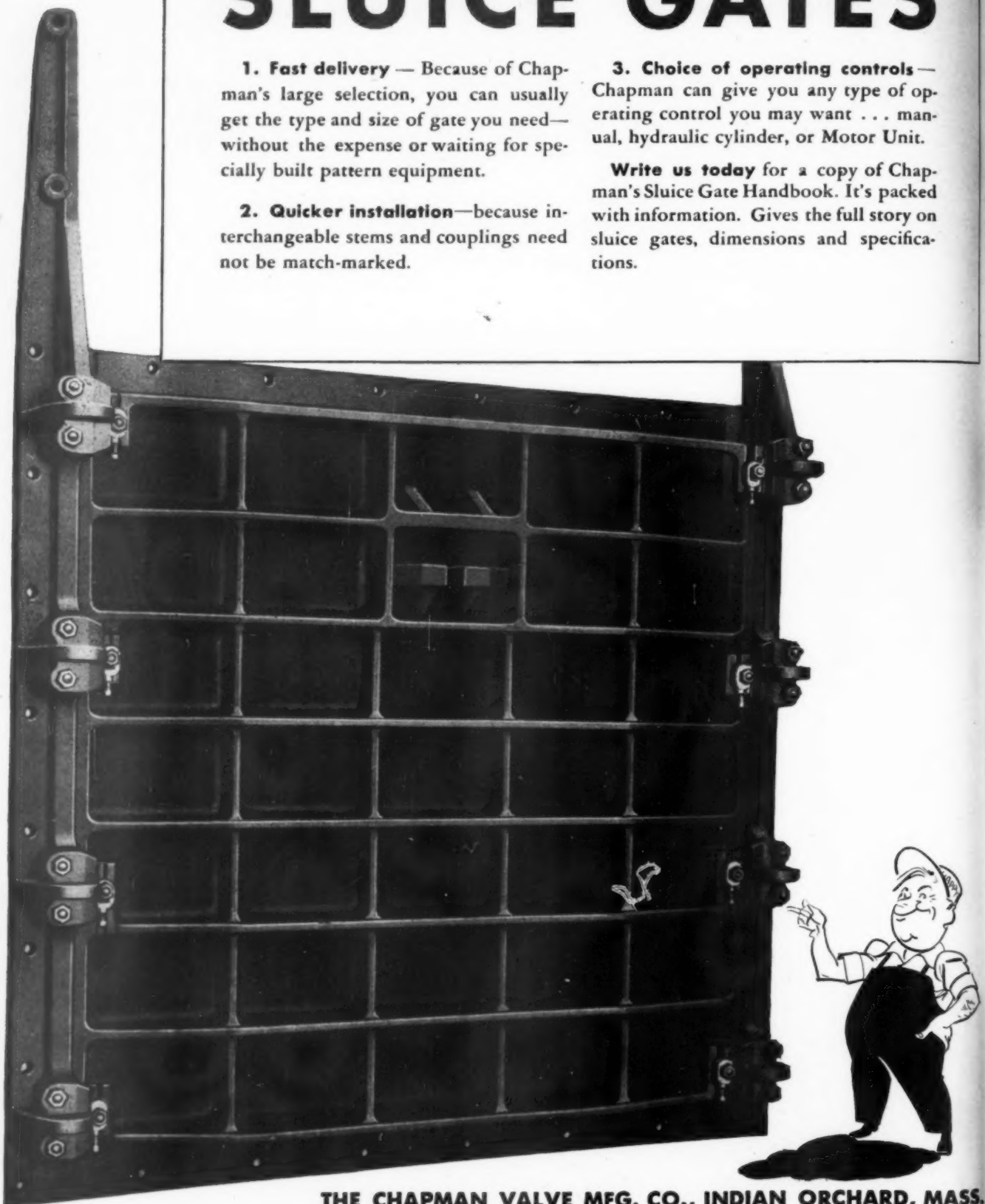
SLUICE GATES

1. Fast delivery — Because of Chapman's large selection, you can usually get the type and size of gate you need—without the expense or waiting for specially built pattern equipment.

2. Quicker installation—because interchangeable stems and couplings need not be match-marked.

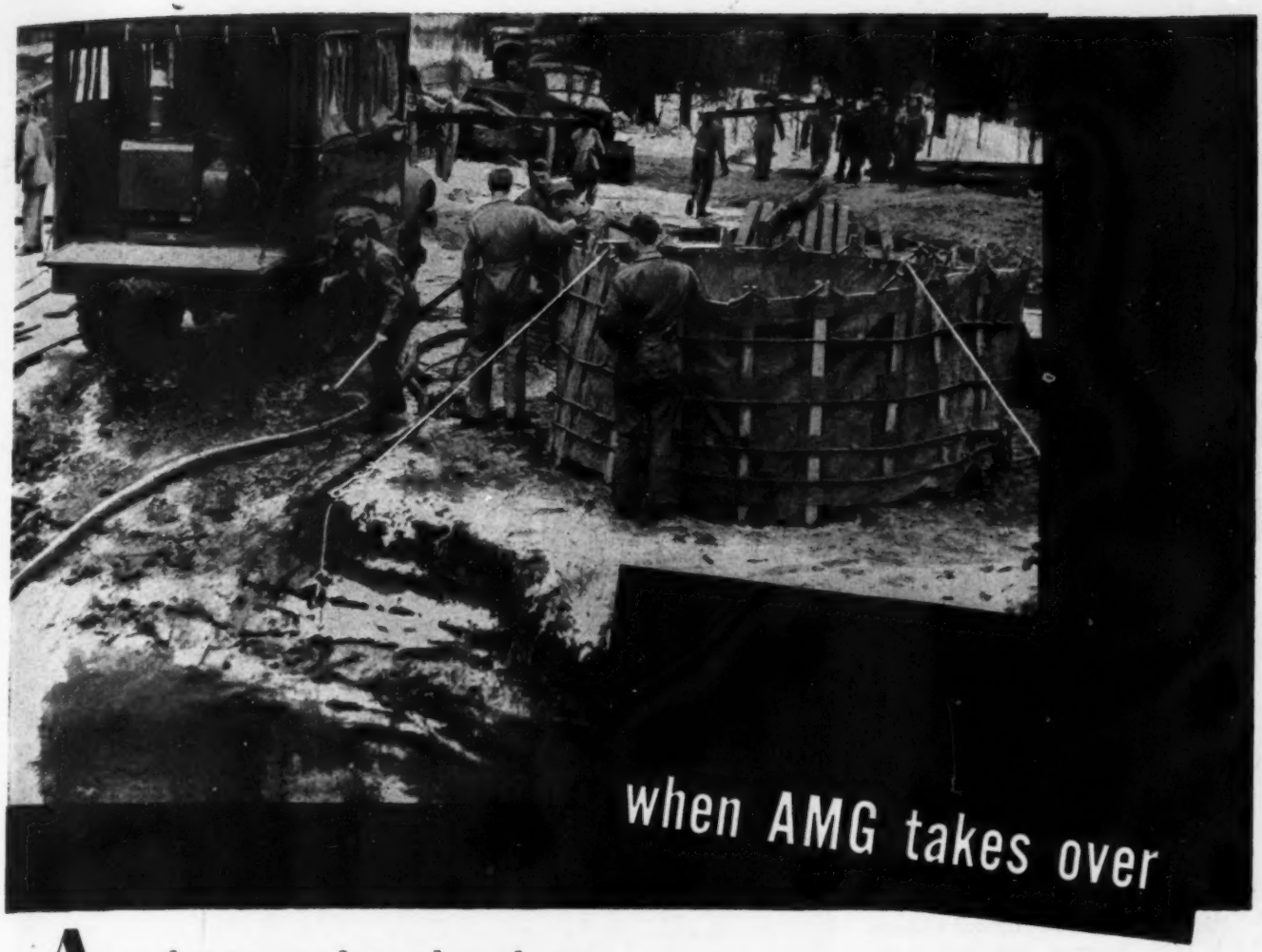
3. Choice of operating controls—Chapman can give you any type of operating control you may want . . . manual, hydraulic cylinder, or Motor Unit.

Write us today for a copy of Chapman's Sluice Gate Handbook. It's packed with information. Gives the full story on sluice gates, dimensions and specifications.



THE CHAPMAN VALVE MFG. CO., INDIAN ORCHARD, MASS.

WATER WORKS & SEWERAGE, September, 1944, Volume 91, Number 9. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.



when AMG takes over

As combat troops advance beyond captured territory, specially trained officers and men move in and take over civilian administration. This is AMG . . . Allied Military Government of occupied territory . . . which includes in its multitude of duties the sanitation of potable water.

After the landings in Sicily and Italy, AMG took control of the water and with the aid of chlorine provided quick protection against water-borne disease.

Chlorine and its compounds are playing many an important role in war sanitation . . . Not only are they used for purifying water at the front and in training camps—but they serve also as bactericides for the medical and dental corps—they are used in laundries for bleaching and disinfecting—in footbaths they protect against common fungus infections.

For these urgent and vital needs Penn Salt supplies much of its present expanded output of chlorine chemicals. That means, possibly, that we cannot fill your order for customary peacetime amounts. However, our wide wartime experience in this field and our increased facilities will be put wholeheartedly at your service as soon as Victory is won.

PENN SALT MANUFACTURES

Liquid Chlorine

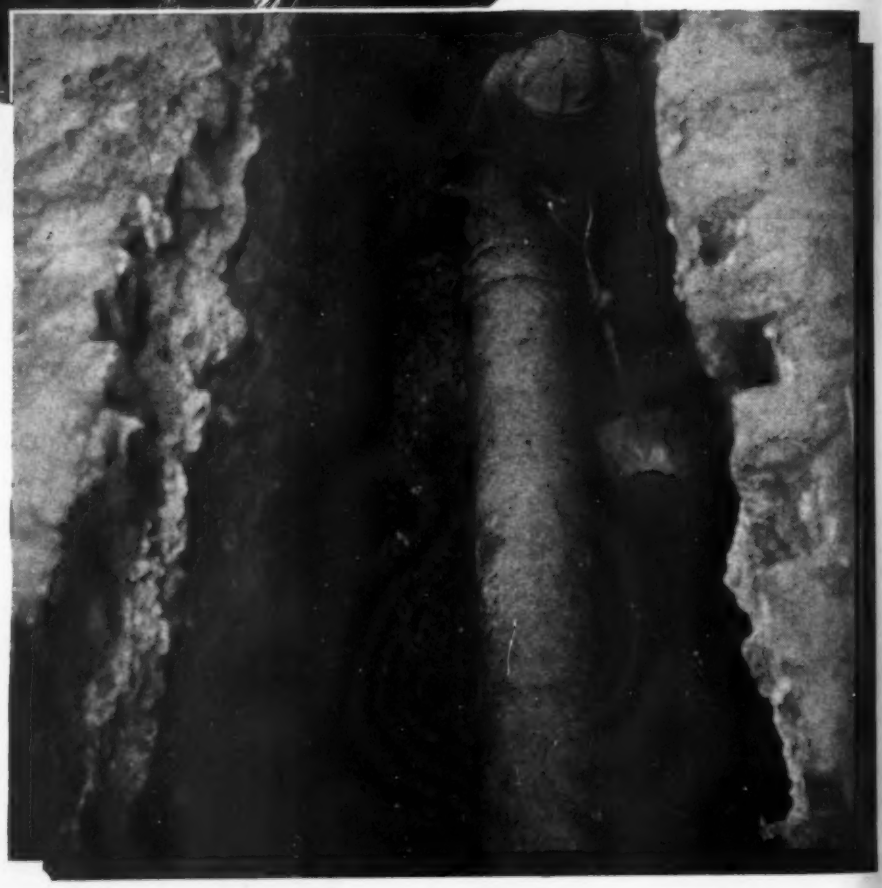
for water sanitation and sewage treatment

ALSO

Perchloron* • Anhydrous Ammonia • Filter Alum
Ferric Chloride • Sodium Aluminate • Chloride of Lime
Caustic Soda and other products

*Trade-Mark Reg. U. S. Pat. Off.

Philadelphia was first lighted with gas in 1836. Fourteen years earlier the Bureau of Water Supply had laid a cast iron main which is still in service—the oldest cast iron water main in America. Unretouched photograph at right shows a section of this old main temporarily uncovered for inspection.



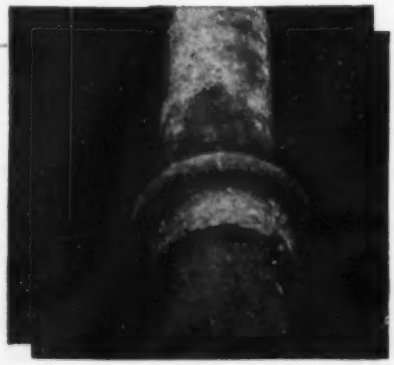
122 YEARS OF CONTINUOUS SERVICE IN PHILADELPHIA

CAST IRON PIPE

her first municipal gas lamps were lighted-

Philadelphia laid a cast iron water main which is STILL IN SERVICE

Detroit, Michigan: Unretouched photograph of section of a 105-year-old cast iron water main.



Charleston, S. C.: Unretouched photograph of section of a 106-year-old cast iron gas main.

OIL LAMPS still lighted the sidewalks of New York and Philadelphia when America's oldest cast iron water main went into service in the year 1822. (Philadelphia was not lighted with gas until 1836.) Such bits of history help one to realize what radically changed conditions cast iron mains have lived through in more than a century of service.

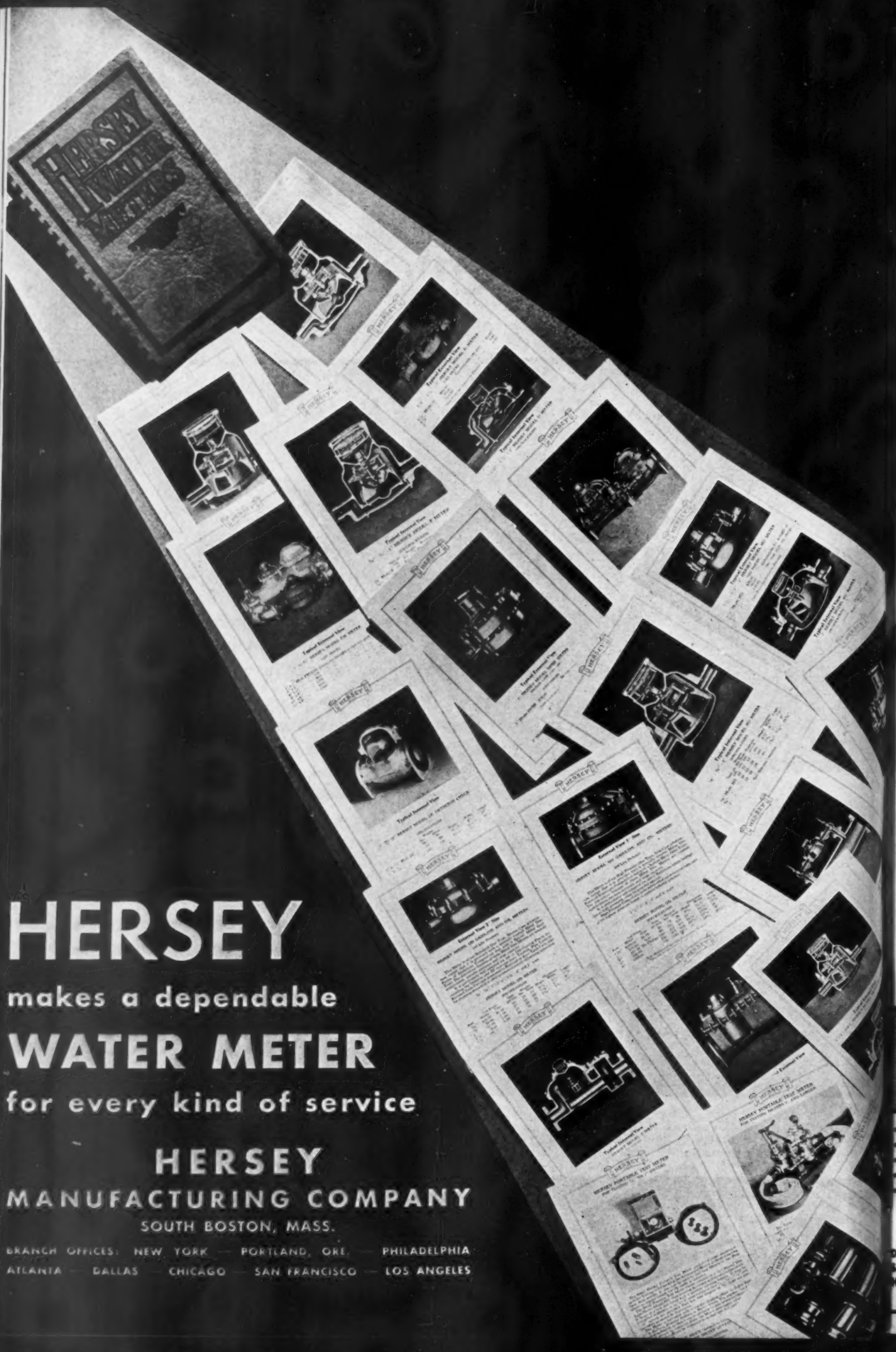
The three cast iron mains shown in this advertisement, photographed while temporarily uncovered for inspection, are from 105 to 122 years old. These good and faithful public servants have paid for themselves many times over—have survived revolutionary changes in traffic conditions, building construction and public services—yet they are still rendering satisfactory service.

History is on the side of cast iron pipe—a history of long life, low maintenance, low cost per service year. But the brightest pages of its history lie ahead. For today's cast iron pipe is far different from the pipe of 100 years ago. It is made to scientific design, based on continuing field and foundry research, and with highly-developed production and laboratory controls at every step.

CAST IRON PIPE RESEARCH ASSOCIATION

Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3

Serves for Centuries



HERSEY

makes a dependable

WATER METER

for every kind of service

HERSEY
MANUFACTURING COMPANY

SOUTH BOSTON, MASS.

BRANCH OFFICES: NEW YORK — PORTLAND, ORE. — PHILADELPHIA
ATLANTA — DALLAS — CHICAGO — SAN FRANCISCO — LOS ANGELES

TO LAY

YOUR BELL & SPIGOT WATER LINES

FASTER AND MORE EASILY

Use the sulphur base jointing compound that seals quickly, making a permanently tight union and permitting immediate back filling and clearing up of traffic hazards.

This compound melts quickly, pours easily, sets rapidly, needs no deep bell holes or caulking. If sudden storm finds it unprotected on the job, no harm will be done, for it is impervious to moisture. If it travels a rough road by rail or truck from plant to point of use, its chemical composition won't be upset by shaking down, to make trouble later.

Your men will like the ease with which the 10 lb. ingot is handled, stored and shipped . . . and too, it will save travel and storage space.

AND TO MAINTAIN

BELL & SPIGOT LINES

MORE ECONOMICALLY

Tegul-MINERALEAD will re-seal quickly any small jointing leaks that might develop after the line is buried . . . and will withstand far greater vibration, mechanical and thermal shock than it is likely ever to meet in service.

Tegul-MINERALEAD

- Is an expeditor of main laying and a sound maintenance economy.
- Field service men at addresses listed. Stocks maintained conveniently near you. For more information, put the coupon to work . . . NOW!

THE ATLAS MINERAL PRODUCTS COMPANY
of Penna.
Mertztown Pennsylvania
The House of Jointing Materials

*ATLANTA 3, Ga., 610 Red Rock Bldg.
*CHICAGO 1, Ill., 333 No. Michigan Ave.
*DALLAS 5, Tex., 3921 Purdue St.
*DETROIT 2, Mich., 2970 W. Grand Blvd.
*JACKSONVILLE 5, Fla., 1463 Talbot Ave.
*KANSAS CITY 2, Kan., 1913 Tauromee Ave.
NEW YORK 16, N. Y. 280 Madison Ave.
PITTSBURGH 10, Pa., 4656 Old Boston Rd.
TORONTO, Ont., McRae Engineering Equipment, Ltd. 11 King St., West

THE ATLAS MINERAL PRODUCTS COMPANY of California
REDWOOD CITY, California

DENVER 2, Col., 1921 Blake St.
SALT LAKE CITY 11, Utah, 1212 So. State St.
HONOLULU 2, Hawaii, U. S. A.
*LOS ANGELES 12, Cal., 817 Yale St.
*SEATTLE 14, Wash., H. D. Fowler Company P. O. Box 3084

*Stocks carried at these points

THE ATLAS MINERAL PRODUCTS COMPANY OF PA.
MERTZTOWN, PENNSYLVANIA.

We would like more information on TIME SAVING and other economies in laying Bell & Spigot water main.

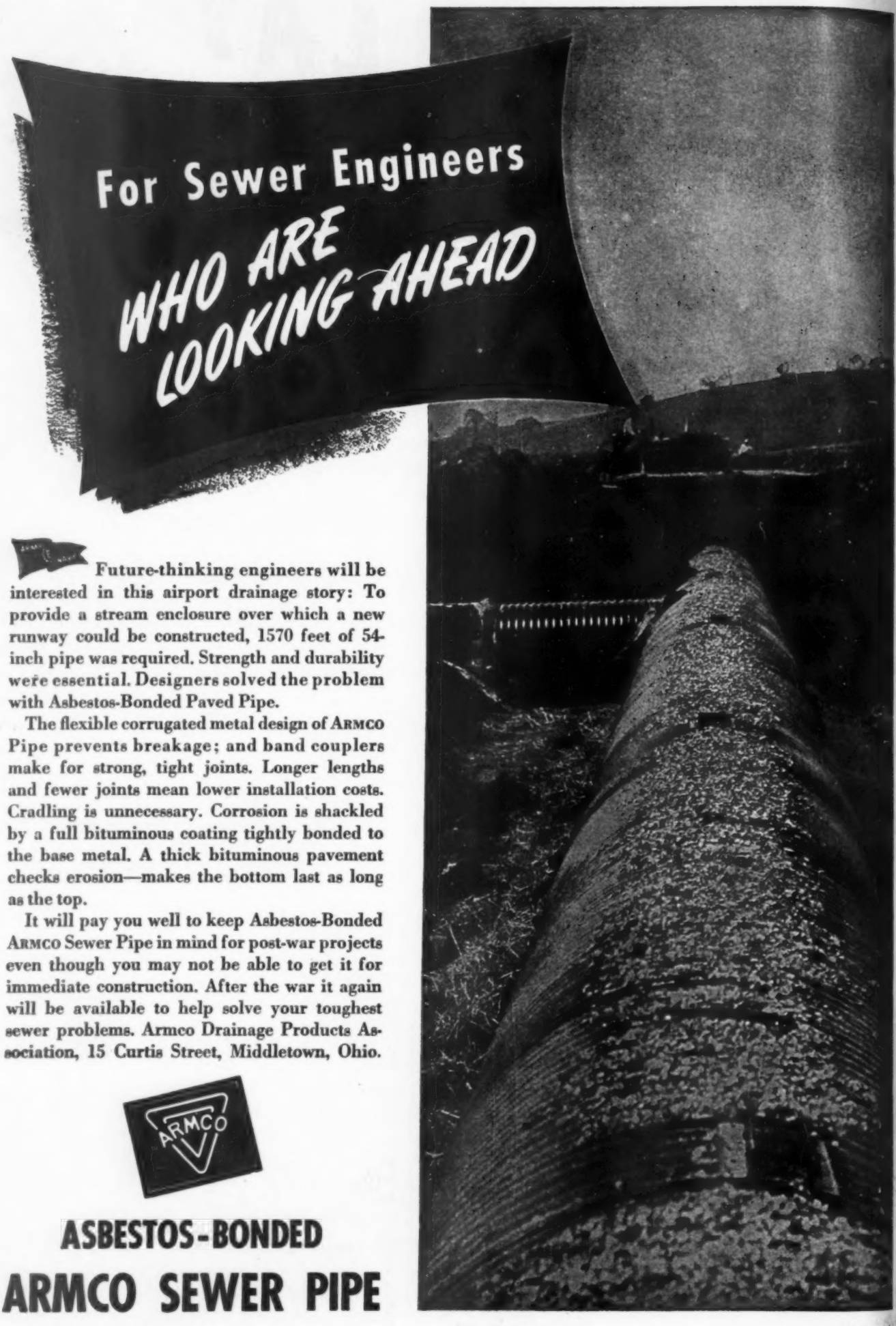
Please address:

Company .....

Address .....

Attention of .....

WW&S 9-44



Future-thinking engineers will be interested in this airport drainage story: To provide a stream enclosure over which a new runway could be constructed, 1570 feet of 54-inch pipe was required. Strength and durability were essential. Designers solved the problem with Asbestos-Bonded Paved Pipe.

The flexible corrugated metal design of ARMCO Pipe prevents breakage; and band couplers make for strong, tight joints. Longer lengths and fewer joints mean lower installation costs. Cradling is unnecessary. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosion—makes the bottom last as long as the top.

It will pay you well to keep Asbestos-Bonded ARMCO Sewer Pipe in mind for post-war projects even though you may not be able to get it for immediate construction. After the war it again will be available to help solve your toughest sewer problems. Armco Drainage Products Association, 15 Curtis Street, Middletown, Ohio.

ARMCO

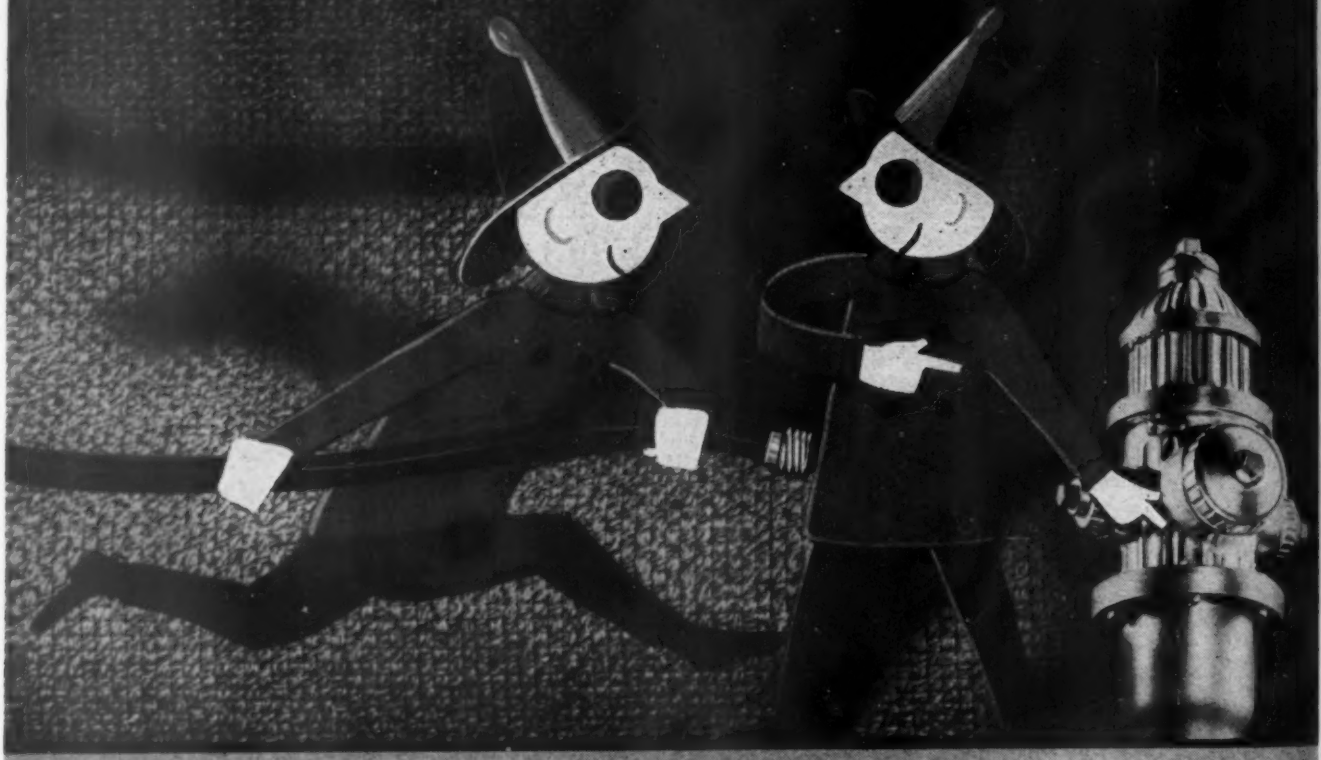
ASBESTOS-BONDED

ARMCO SEWER PIPE

Diamond
Liquid Chlorine
is always uniform
and free from
unwanted impurities
Whether you buy by the carload or in individual cylinders, Diamond Liquid Chlorine is always dependable in purity and uniformity. A very important part of our manufacturing process is the rigid control over quality maintained at every processing step.
Specify DIAMOND to insure the quality of your Liquid Chlorine.
DIAMOND
ALKALI CO.
PITTSBURGH 22, PA.
AND EVERYWHERE
Consult Diamond
Technical Service for
Greater Efficiency in
Using Liquid Chlorine!

WHEN THE CALL COMES MATHEWS ARE READY!

There is no need to worry over hydrant-failure — that nightmare to many a fire department — when you install Mathews Modernized Hydrants. Their construction is simple and rugged, requiring little attention and repair. When a traffic smash or other cause makes it necessary, they are easily and quickly replaced without digging or breaking pavement. Two men in 15 minutes can unscrew the damaged barrel containing all the working parts and put a new one in its place. Mathews Hydrants not only give your community more dependable protection, but they enable you to cut maintenance costs to the bone. Make it a point to include Mathews Hydrants in your post-war plan.



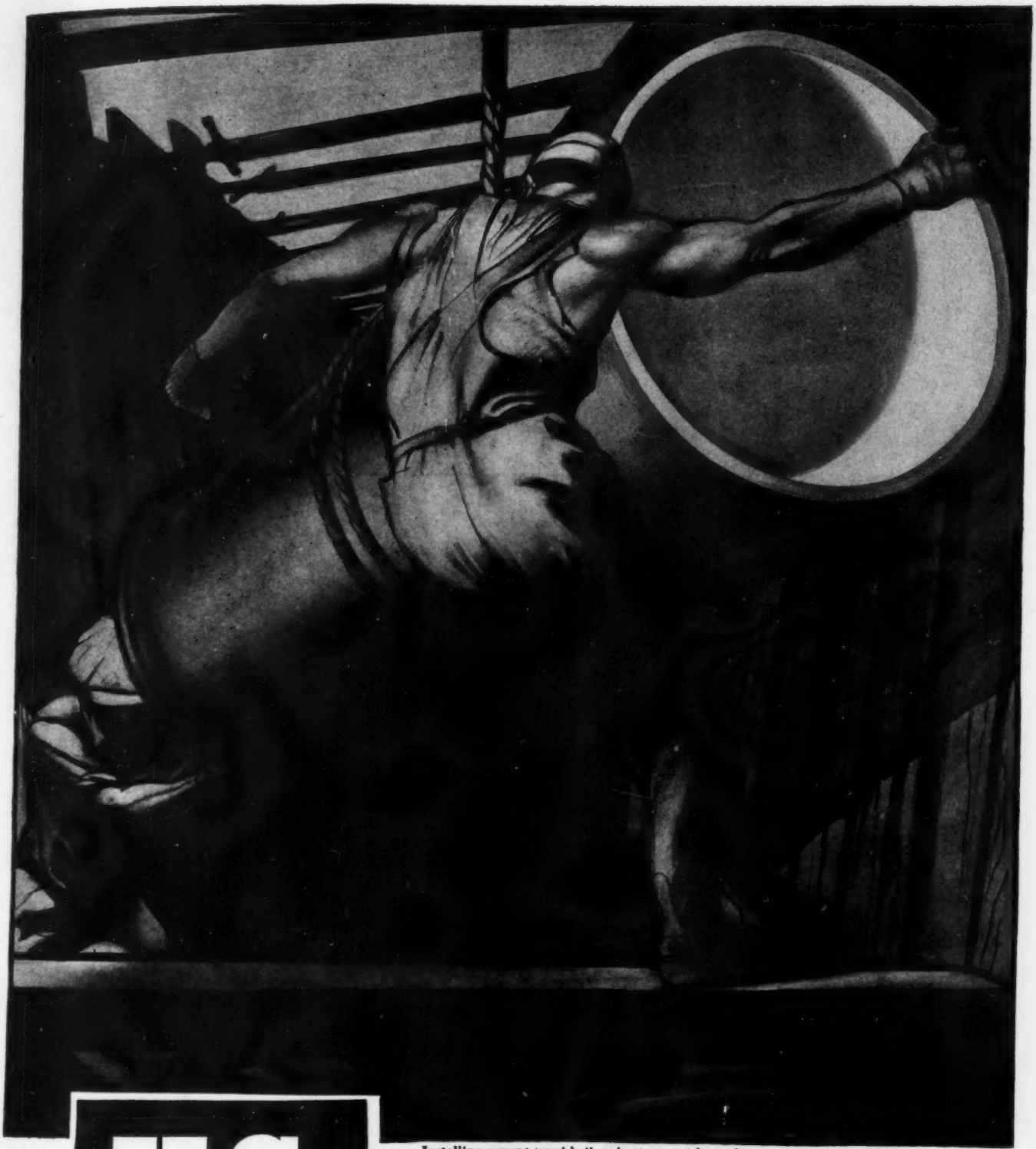
MATHEWS HYDRANTS

400 CHESTNUT STREET, PHILADELPHIA, PA.

ESTABLISHED IN 1803

Made by R. D. WOOD Company

MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES



Installing cement-lined bell-and-spigot cast iron pipe.
Drawn by Rico Lebrun for U. S. Pipe & Foundry Co.

U.S. cast iron PIPE

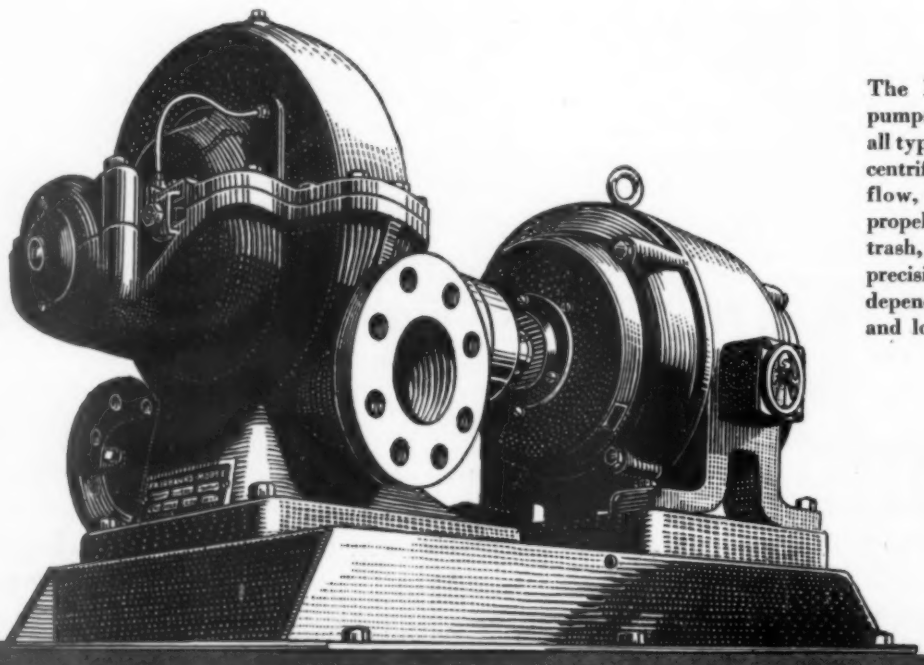
U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

Everybody knows that cast iron pipe stubbornly resists corrosion. Century-old mains still in service prove that—and since those mains were laid under streets originally designed for horse-drawn vehicles, inherent crushing strength and impact-resistance are also proved. Current rigid metallurgical and production controls assure continuance of these essential qualities for underground mains.

A name worth remembering!

FAIRBANKS-MORSE

After the war, the name Fairbanks-Morse will continue to mark performance-proved products only, as it has for 114 years. No race to get civilian products onto the market early will tempt us to break this pledge.



The Fairbanks-Morse line of pumps is complete and includes all types — centrifugal, split-case centrifugal, built-together, angle-flow, power, rotary, turbine, propeller, paper stock, sewage, trash, and many others. All are precision built to give efficient, dependable, low-cost operation and longer trouble-free service.

BUY MORE WAR BONDS

DIESEL LOCOMOTIVES • DIESEL ENGINES • GENERATORS • MOTORS • SCALES • PUMPS • STOKERS • RAILROAD AND FARM EQUIPMENT

FAIRBANKS, MORSE & CO., CHICAGO 5, ILLINOIS

...JOBS MUST BE MADE

WHEN THEY COME BACK HOME, we'll all be there with cheers and shouts . . . but that's not enough. *We must be there with jobs.* For remember, when the parade is over, the men of your community will need plenty of work to carry them over the "war-to-peace conversion" period.

That's why *today* it is up to your municipal officials to start planning the Public Works Programs which will put your local citizens back to work—right in your own home town.

In water supply, sewerage and drainage projects, the Lock Joint Pipe Company is prepared to set up temporary plants in your community. Such a project will employ up to 90% of its workers from your locality . . . help your merchants through the local purchase of a large quantity of supplies and materials . . . and circulate most of the money in your own community.

By specifying Lock Joint Concrete Pipelines, you'll have jobs ready for your engineers, mechanics, laborers and other skilled workers—and you'll be installing pipelines which will give you a century of useful service.

Whether your project is large or small, for the present or future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.

LOCK JOINT PIPE COMPANY

Established 1905

AMPERE, NEW JERSEY

Denver, Colo. • Chicago, Ill. • Kenilworth, N. J. • Kansas City, Mo. • Rock Island, Ill. Joplin, Mo. • Valley Park, Mo. • Cleveland, Ohio • Hartford, Conn. • Navarre, Ohio

SCOPE OF SERVICES: *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

Strictly ~~on~~ off the Level!

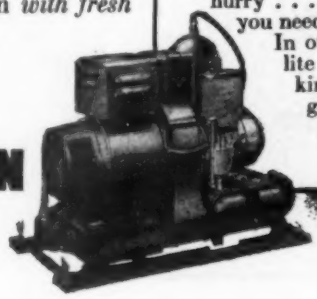
Our Army Tanks are built for the high seas of dry land . . . up, over and down . . . up, over and down. The equipment that goes into those tanks must be able to operate perfectly no matter how rough the going.

Homelite gasoline-engine-driven Generators are used in M3 and M4 tanks for supplying electricity for radio, for gun turret operation and for battery charging. And no matter whether the tank is sticking its nose up in the air or taking a dive into a hole . . . *regardless of the angle* . . . the Homelite runs without trouble.

You see, a Homelite uses no crankcase oil . . . no oil sump that must be kept level and free from sludge. The oil is mixed right in with the gasoline in the Homelite's fuel tank . . . assuring a penetrating, complete and thorough job of lubrication *with fresh clean oil* at any angle.

For operating floodlights or portable electric tools on emergency or maintenance work, you want a light, easily portable generator that doesn't have to be set up on a level floor for perfect operation. You want a generator that can be set up anywhere in a hurry . . . at any angle . . . any place you need a power unit.

In other words you need a Homelite Portable Generator . . . the kind that performs like a real, good soldier in the roughest going tanks.



HOMELITE CORPORATION

PORT CHESTER, NEW YORK

The Story Behind Some MUNICIPALITIES

KNOXVILLE, Tennessee

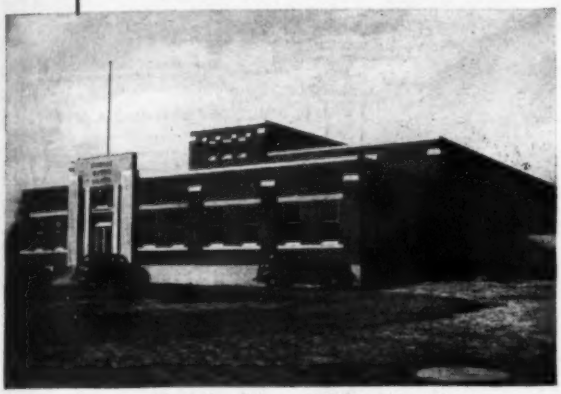
MOBILE, Alabama

NEWPORT NEWS, Virginia

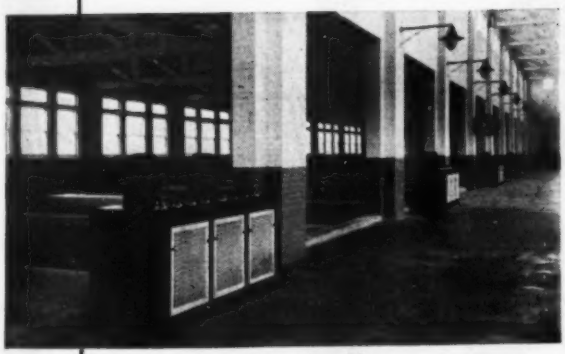
NORFOLK, Virginia

WILMINGTON, N. Carolina

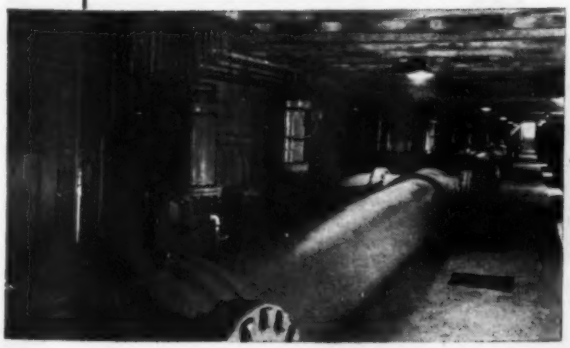
City of Mobile, Ala. Filtration Plant, built under war time conditions and restrictions—Capacity 20,000,000 Gallons per day.



Exterior View of Filtration Plant



Operating Floor



Pipe Gallery

These are typical "war affected" areas, where rapid industrial and population growth have necessitated emergency measures to assure adequate pure water supply.

Roberts equipped water treatment plants have been installed in these and other areas, during the war with its attendant restrictions.

In spite of war time restrictions and a large number of "earmarked" Government water treatment plants, Roberts Filter engineers continue to be in a position to cooperate in the projection of similar Municipal plants for present or post war construction. You can depend on Roberts.

MECHANICAL EQUIPMENT
BY
ROBERTS FILTER MFG. CO.
607 COLUMBIA AVE.
DARBY, PENNA.

THIS NAME PLATE is our pledge of cooperation—of adherence to specifications—of quality of materials—of excellence of workmanship—of continuing interest long after the contract price has been paid.

BLUE PRINT NOW

THE IMPORTANT VALVES ARE THE ONES *YOU* USE!

Claims and counter-claims about Gate Valves mean nothing after they are installed on the job. It is PERFORMANCE that counts then and those valves are the ones you are vitally interested in. They must be dependable—they must operate smoothly—they must close tightly without leaking, and they must give years of service without undue maintenance.

Mueller-Columbians are just such valves. Due to the FOUR-POINT wedging action, the pressure is exerted at the EDGES of the valve discs. This prevents any chance of sprung or warped discs and insures tight closing. There are many other points of superiority that you should know about before you install any valve. Write us for full information today.

HYDRAULICALLY OPERATED GATE VALVE

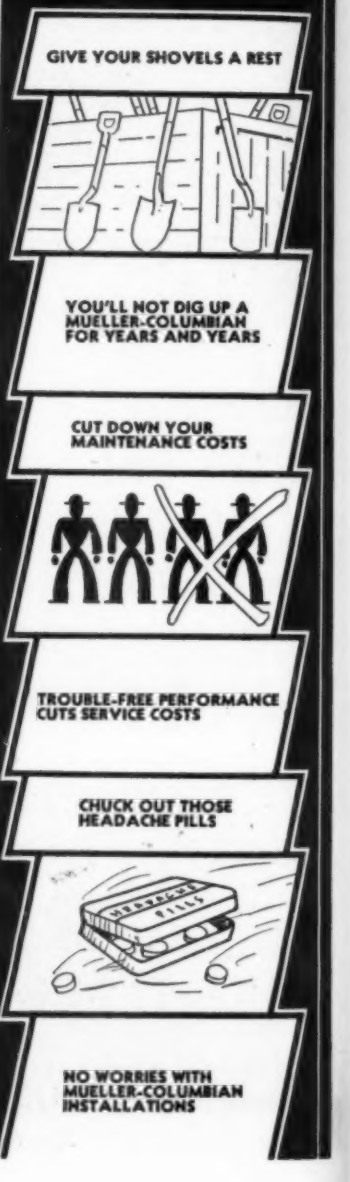
SECTIONAL VIEW OF GATE VALVE

HAND OPERATED GATE VALVE WITH BY-PASS

GATE ASSEMBLY (OPENED)

MUELLER CO.

CHATTANOOGA, TENN.


GIVE YOUR SHOVELS A REST
YOU'LL NOT DIG UP A MUELLER-COLUMBIAN FOR YEARS AND YEARS
CUT DOWN YOUR MAINTENANCE COSTS
TROUBLE-FREE PERFORMANCE CUTS SERVICE COSTS
CHUCK OUT THOSE HEADACHE PILLS
NO WORRIES WITH MUELLER-COLUMBIAN INSTALLATIONS

Corrosion and tuberculation are the saboteurs to guard against in your water mains. Unchecked—these agents of time and wear can cause irreparable damage. So play safe and give those water supply lines a protective lining of thin, dense cement mortar. Applied in place speedily and economically the Centriline way, this sleek new lining will provide a non-corrosive non-tuberculating surface, shielding the underlying metal (whether steel or cast iron), assuring a permanently high coefficient and increased longevity.

Wherever your pipeline is situated, whatever its length—if its diameter is 30" or more—our men can quickly reach and recondition it. Hurry . . . don't let the Gremlins get there first.

CENTRILINE PROCESS

CENTRILINE CORPORATION

148 CEDAR STREET • NEW YORK 6, N. Y.

The Centriline process is a rapid and economical method of reconditioning pipe lines. It consists of first cleaning the main and then applying, by centrifugal force, a dense cement mortar lining of required thickness, mechanically troweled to a smooth finish. This is done underground, in place.

Restores and Protects Pipe-Line Carrying Capacity

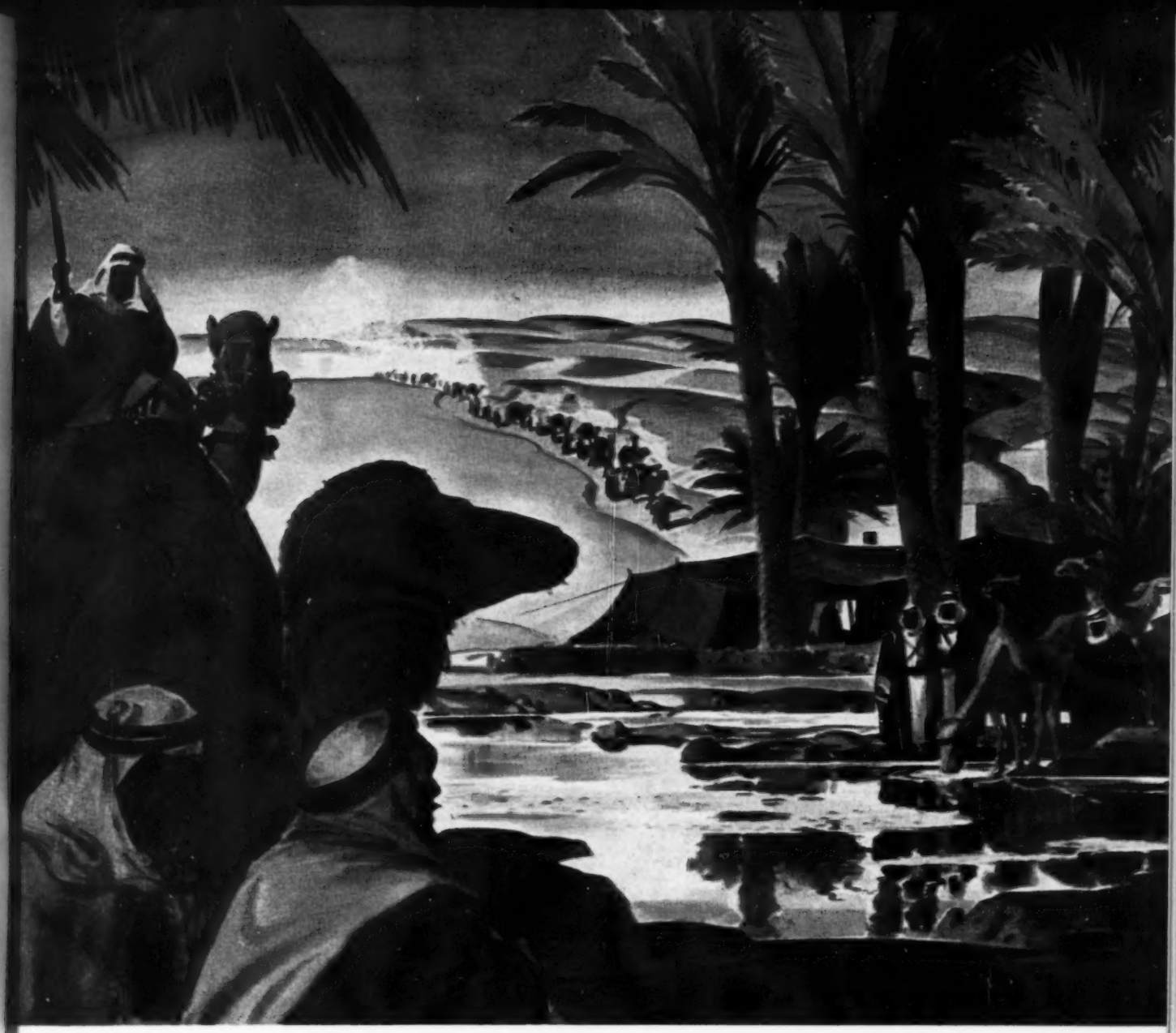
TO A RELATIVELY few thousand men has fallen the task of supplying pure water and waste disposal to the communities and industries of the nation.

The task of maintaining this service requires constant diligence and foresight. The fact that Simplex flow instruments, controllers, valves, primary devices, and special equipment are giving efficient service in thousands of plants indicates the dependence which is being placed upon the equipment which we make. Just as important, but not so obvious, are the contributions made by the Simplex engineering staff. Here, knowledge and experience are applied to your specific requirements for the most effective solution to a need or a problem.

So, if you're selling service in an executive, operating, or consulting capacity, count Simplex as a part of your organization—expertly equipped to lighten your burden.

If you're selling Service

SIMPLEX VALVE & METER CO.
6743 UPLAND STREET, PHILADELPHIA 42, PENNA.



Where Rests the Caravan

Across the sun-seared desert trek the plodding caravans. They are guided and drawn to refreshing oases, nested in arid wastes. At these blessed and bubbling springs, man and beast quench their thirst.

Water guides the progress of civilization, just as the desert oasis lures the caravan. Cities prosper where an abundance of fine water exists. Many war industries were established in locations offering the best water facilities.

But future growth of cities may be *retarded* by present *outmoded* water systems. So now is the time to give thought to the post-war water horizon. Start blueprinting water works construction. Logically, you should now make adequate provision for *accurate metering!*

Pittsburgh-National Water Meters have maintained an enviable war-time record in thousands of communities. They make possible the maintenance of full water services where facilities are taxed to capacity. They guarantee the maximum of revenue, reduce operating costs and equitably apportion charges to users. Without metered control water waste can run rampant.

Pittsburgh-National will continue to serve the water systems of America with the best of equipment through wartime, and with increased service in the peace to follow.

PITTSBURGH-NATIONAL METERS

—charged with the responsibility of accurately measuring water

Interesting Facts About WATER

WATER TEMPERATURE—Water will not go colder than 32°F. atmospherically. The eskimo keeps warm inside of his igloo even when the outside temperature is —60°.

BOILING RANGE—Water boils at 212°F. at sea level. At 5000 feet altitude it boils at 203°. At 10,000 feet, 194°. If boiled at the Dead Sea it requires 214° to reach the boiling point.

WATER WEIGHT—When ice floats, about one-ninth of its volume is above water. Only a small portion of an iceberg is seen above water.

HUMAN NEEDS—The human body is two-thirds water. If a 150-pound person were depleted of all water, the remaining solid matter would weigh only 50 pounds.

FALLING RAIN—One inch of rain falling on an acre of ground weighs 113 tons. An equal amount of water is contained in a snowfall of 10 to 12 feet deep.

Good Management

BEGINS WITH

Good Measurement

IN MAKING decisions, facts are often more important than judgment. The figures resulting from accurate measurement are essential facts to the proper management of every water property. Then, too, confidence in measuring equipment gives the water works' superintendent an assurance of accuracy in his dealings with customers. Even more important from the management angle is the fair and equitable revenue produced by accurate, long-lived meters. Pittsburgh-National Meters provide management with the ultimate in good measurement. They embody the best in design, thought, material, and workmanship. Pittsburgh-National builds all types of meters in the quality field. From this complete line can be selected a type and size for every requirement or personal preference.

PITTSBURGH-NATIONAL

Water Meters

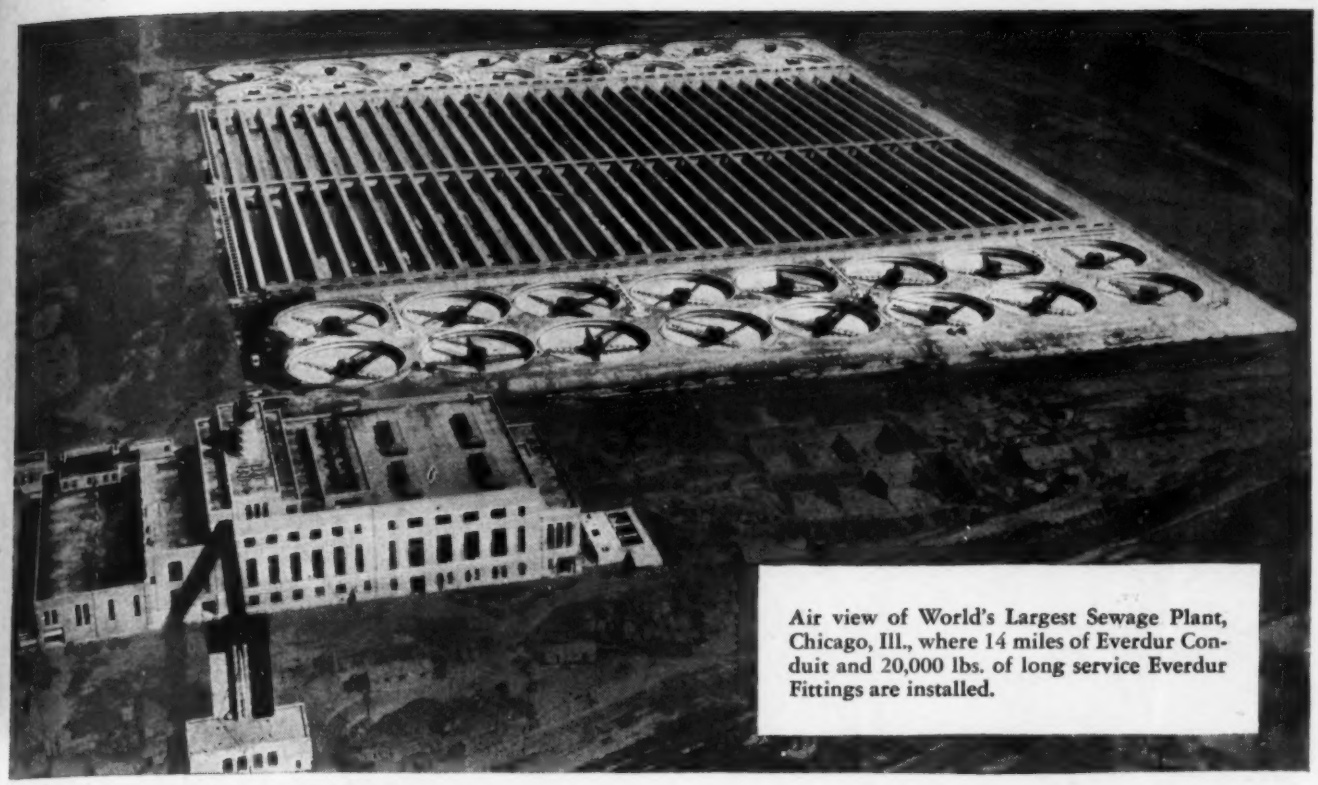
PITTSBURGH EQUITABLE METER COMPANY

MERCO NORDSTROM VALVE COMPANY

Main Offices: Pittsburgh 8, Penna.

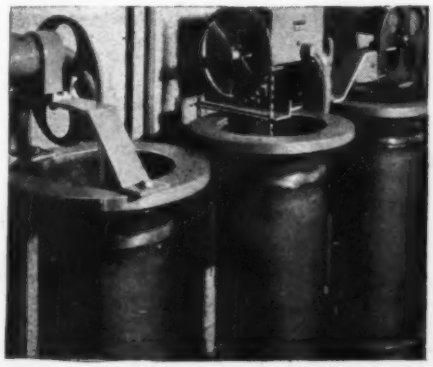
NATIONAL METER DIVISION, BROOKLYN, N. Y.

Atlanta, Boston, Brooklyn, Buffalo, Chicago, Columbia, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa.



Air view of World's Largest Sewage Plant, Chicago, Ill., where 14 miles of Everdur Conduit and 20,000 lbs. of long service Everdur Fittings are installed.

Laughlin Automatic Traveling-Type Screen installed in the Dearborn, Michigan Sewage Treatment Plant. The Everdur blades have taken twelve years of punishing service, yet are still sound.



Float Tubes, 12 inches diameter, 45 feet long, fabricated of Everdur Sheet, welded. Designed by Krajewski-Pesant Mfg. Corp. for use in Wards Island Sewage Disposal Plant, New York. After seven years of service the float tubes are in excellent condition.

SEWAGE TREATMENT PLANNING

also involves

PLANNING AGAINST CORROSION

FROM THE INITIAL SCREENING of raw sewage to the removal of dried sludge, the operation of the modern sewage treatment plant is a battle against corrosion—against the deteriorating effects of gases, moisture, moisture-saturated air and the corrosive action of sludge. Many metals, which under normal conditions of use would give years of trouble-free service, break down under the corrosive influences attending the processing of sewage.

That is why *Everdur** (copper-silicon alloy) is specified for so many heavy-duty service jobs in sewage plants. Everdur combines the corrosion resistance of pure copper with the tensile strength of mild steel. It is readily welded, and has high resistance to fatigue. For detailed information on *Everdur Metal* write for Publication E-11.

*Reg. U.S. Pat. Off.

EVERDUR METAL

is used in sewage works for Coarse and Fine Screens, Swing Gates, Built-up Sluice Gates, Coarse Bar Rack Aprons, Effluent Weirs and Scum Weirs, Structural Scum Baffle Brackets, Troughs, Screen Hoppers, Orifices, Baskets, Anchors, Ladders, Float Gage Chains, Valve Springs, Manhole Steps, Guides, Walkways, Bars and Plates, Bolts and Nuts.

44183

BUY WAR BONDS... buy more than before

ANACONDA

Everdur Metal

THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Conn.

Subsidiary of Anaconda Copper Mining Company—In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Snapshots from the

CONNECTICUT

WISCONSIN

TEXAS

GEORGIA

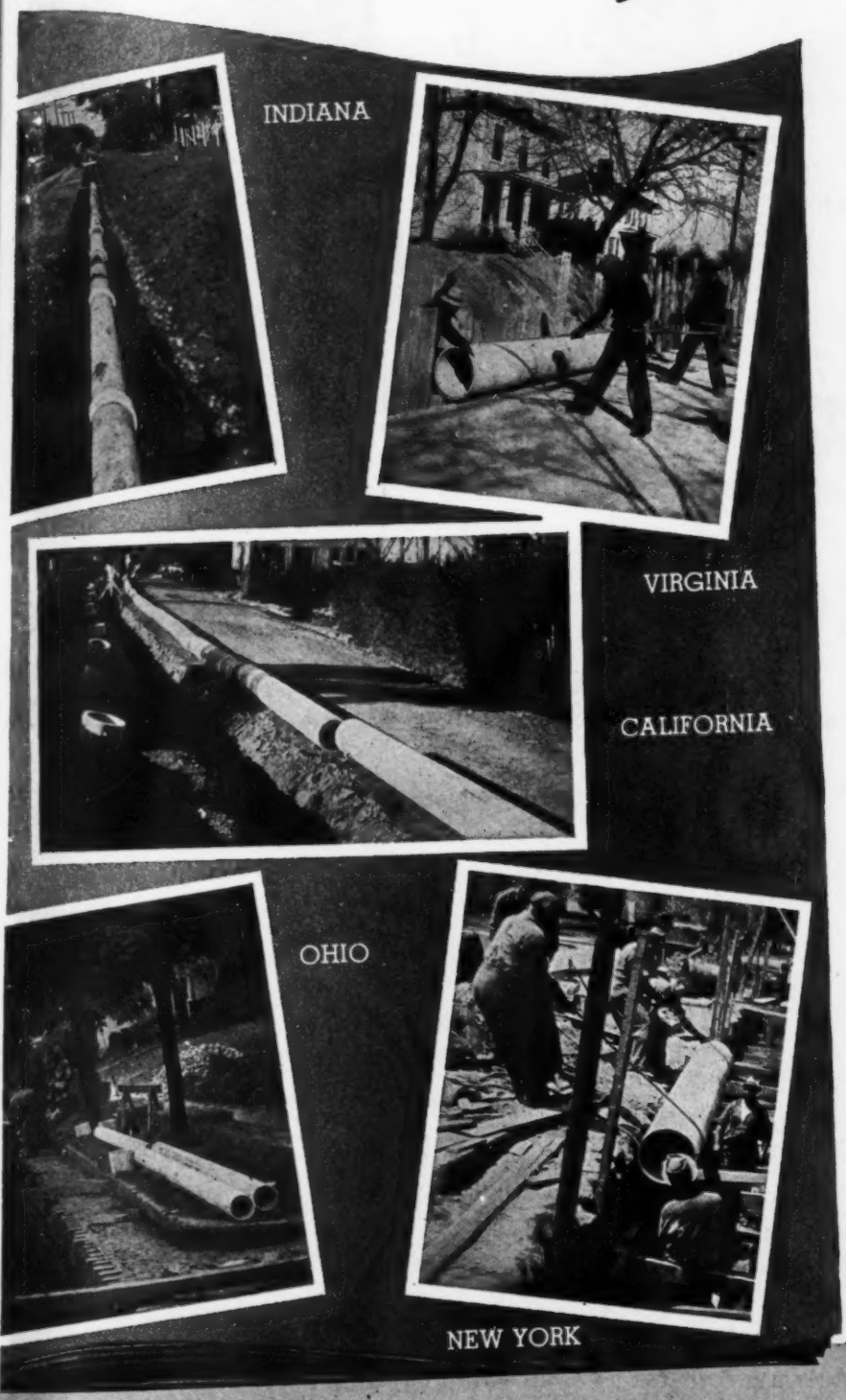
ARKANSAS

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

Transite Pipe Album

OF EFFICIENT, LOW-COST INSTALLATIONS



JOHNS-MANVILLE'S FILES contain literally thousands of photographs of Transite Pipe installations. In cities, towns and villages. In every state in the Union. Impressive visual evidence of the nationwide acceptance for the asbestos-cement pipe that offers these important advantages:

Easy Handling. Light-weight Transite Pipe requires fewer men for handling. Only the larger sizes need mechanical handling equipment.

Rapid Assembly. Even unskilled crews form tight joints easily, quickly with the Simplex Coupling.

Tight, Flexible Joints. Wide sweeps can be made with straight lengths because the Simplex Coupling stays tight even when the line is deflected as much as 5° at each joint.

Low Maintenance. Transite's corrosion-resistance and maintained strength contribute to its low maintenance costs.

Tuberculation No Problem. Non-metallic in composition, Transite cannot tuberculate. Its initial high-flow coefficient (C=140) can never be reduced by tuberculation.

Get the complete facts today by writing for Transite Pipe booklet TR-11A. For details on Transite Sewer Pipe for more efficient sewage disposal systems, ask for TR-21A. Johns-Manville, 22 East 40th Street, New York 16, N. Y.

Transite Pipe is Again Available for Prompt Shipment

Asbestos TRANSITE PIPE

FOR EFFICIENT, ECONOMICAL WATER AND SEWER LINES

Grand Avenue Sewer, Oshkosh, as exposed in 1936 after 40 years of service.

Sewer pipe laid in 1896 as it looked in 1936 after cleaning—Oshkosh, Wisconsin.

Forty-year-old sewer pipe after being relaid in 1936 —Grand Avenue, Oshkosh.

DURABILITY

After 40 years service Concrete Sewer Pipe...still like new...is relaid

IN Oshkosh, Wisconsin, the Grand Avenue sanitary sewer was built with concrete sewer pipe in 1896. In 1936, after 40 years of service, it was exposed as shown in the upper left photograph. The pipes were in such excellent condition that after being cleaned (central picture) they were relaid to a revised gradient (upper right picture).

The relaying of the Grand Avenue sewer in Oshkosh was part of the Fox River Valley clean-up initiated by the State Board of Health and completed in 1936. In this clean-up, more than 46 miles of concrete sewer pipe and reinforced concrete sewer pipe ranging in diameter from 18 to 72 in. were required for the construction of sanitary sewers. Among the cities that formerly discharged untreated sewage into the Fox River are Green Bay, Kaukauna, Appleton, Menasha, Neenah and Oshkosh, Wisconsin.

Concrete sewer pipe has been used for the construction of sanitary and combined sewers in cities of this country for more than 100 years. When you design sewerage improvements now and in the post-war period, specify concrete sewer pipe manufactured by our members (list furnished on request) to meet the test provisions of the standard specifications of the American Society for Testing Materials.

American Concrete Pipe Association

33 West Grand Avenue, Chicago 10, Illinois
342 Munsey Building, Washington 4, D. C.

Sanitation Standards Demand

Modern Sewage Disposal Methods

Sewage Filtration is an important step in the process of municipal Sanitation. Sewage disposal plants must be designed and engineered by experts. Choice of equipment must be based on many factors.

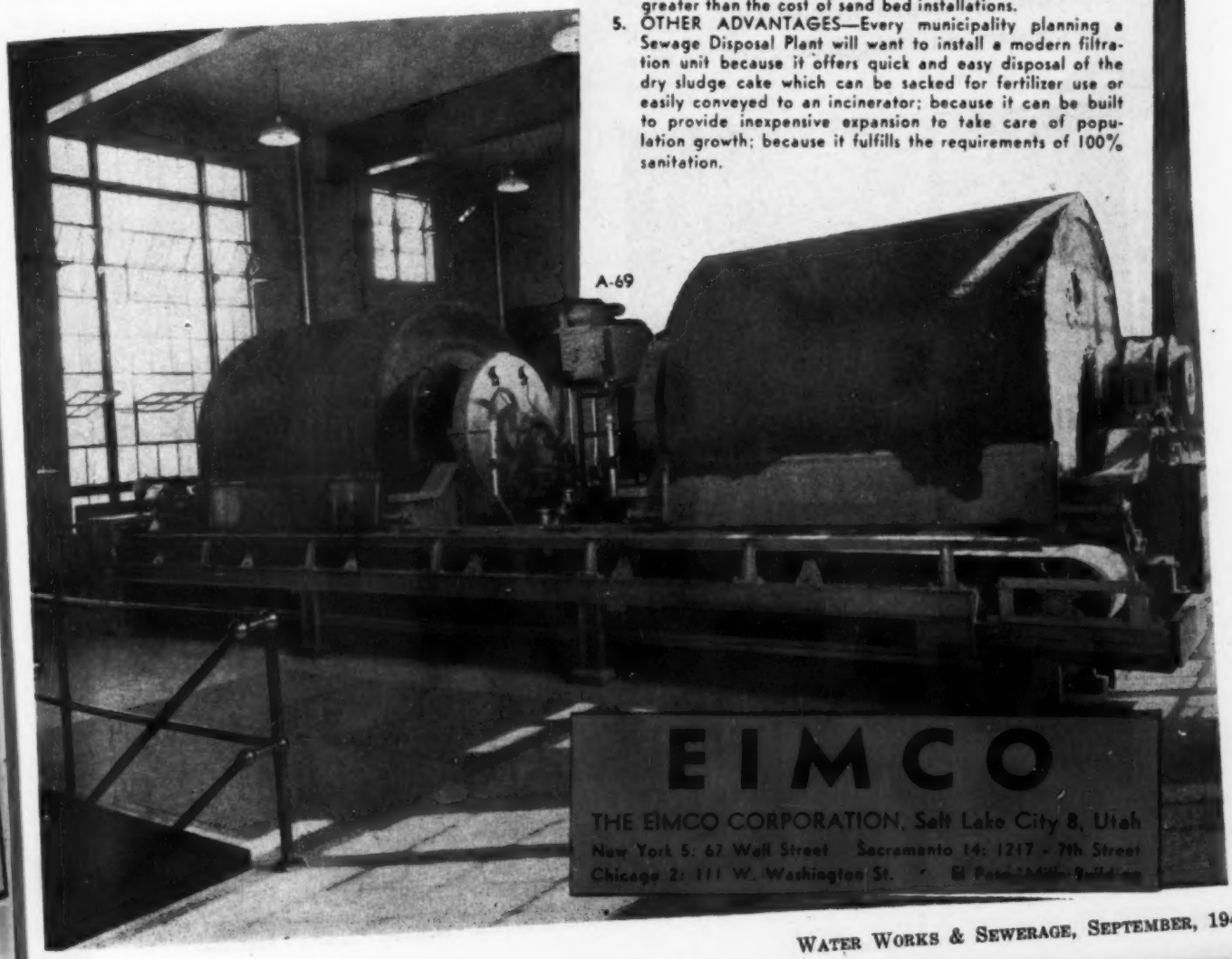
What are the local conditions? How much floor space is available? How should equipment be arranged for maximum efficiency and upkeep? How about future expansion?

Long established supremacy in the Sewage field is due primarily to Eimco's careful investigation of local conditions so that all equipment is custom built to predetermined specifications.

Eimco Engineers welcome an opportunity to aid in planning post-war sewage treatment plants. Why not call on them for assistance now?

. . . between Eimco Filters and sand beds in drying sewage sludge?

1. CONSERVE SPACE—A modern Eimco filter station will dry a comparable amount of sewage sludge in one three hundredth of the area needed for a sand bed!
2. EFFICIENCY—Sand bed drying of sewage sludge is erratic, depends on weather conditions; rains and frosts slow down process, hinder sludge removal. Modern Eimco Filters operate continuously in all kinds of weather under shelter.
3. SANITATION—Open sand beds on which sludge is spread for drying give off unpleasant odors, attract flies and insects whereas Eimco Filters dry sludge without any of these disadvantages.
4. OPERATING COSTS—Cleaning sand beds of sewage sludge is an unpleasant job requiring many laborers for long periods of time whereas an Eimco filter station is operated by one man who has ample time for maintenance work in pleasant surroundings. Initial investment is no greater than the cost of sand bed installations.
5. OTHER ADVANTAGES—Every municipality planning a Sewage Disposal Plant will want to install a modern filtration unit because it offers quick and easy disposal of the dry sludge cake which can be sacked for fertilizer use or easily conveyed to an incinerator; because it can be built to provide inexpensive expansion to take care of population growth; because it fulfills the requirements of 100% sanitation.



A-69

EIMCO

THE EIMCO CORPORATION, Salt Lake City 8, Utah

New York 5: 67 Wall Street Sacramento 14: 1217 - 7th Street

Chicago 2: 111 W. Washington St. El Paso: [illegible]

IMPORTANT

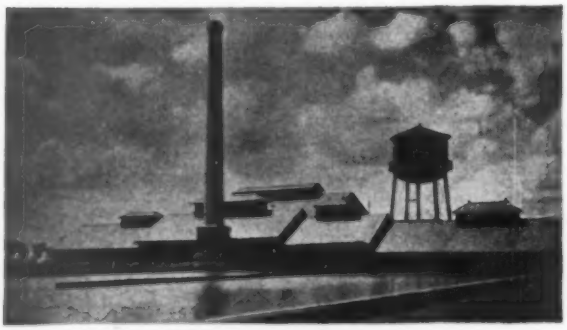
Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

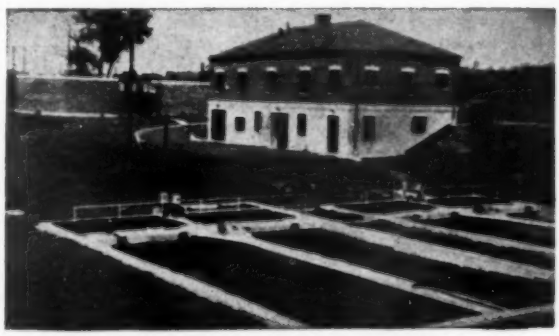
Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.



★ FOR WATER WORKS

1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.



★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

GENERAL CHEMICAL COMPANY

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Co., Ltd. • Montreal • Toronto • Vancouver

PIPELINES SUPPLY YANKS IN FRANCE
A vast network of pipelines now is supplying oil to Allied aircraft, tanks and motor vehicles in Normandy, London radio said today in a broadcast recorded by CBS.
"One set of pipelines carries the oil from tankers off the beaches to tanks ashore. From the tanks, more feeder lines follow the advancing Allied forces. As the advance continues, more tanks and more pipelines are added," London reported.
This invasion pipeline is coupled with Victaulic Pipe Couplings as a standard, making possible amazing speed in laying, and rapid salvage or repair.

U. S. Army Signal Corps Photo

WHEN our first invasion began in North Africa, the U. S. Army Corps of Engineers and the U. S. Quartermaster Corps were ready with the answer to the difficult logistical problem of feeding petroleum products across a beachhead. Invasion pipelines! Victaulic is proud that in North Africa, Sicily, Italy, and now in France our coupling has been a part of this great project.

BACK THIS BIG PUSH WITH A WAR BOND—SPEED THE FINAL PUSHOVER

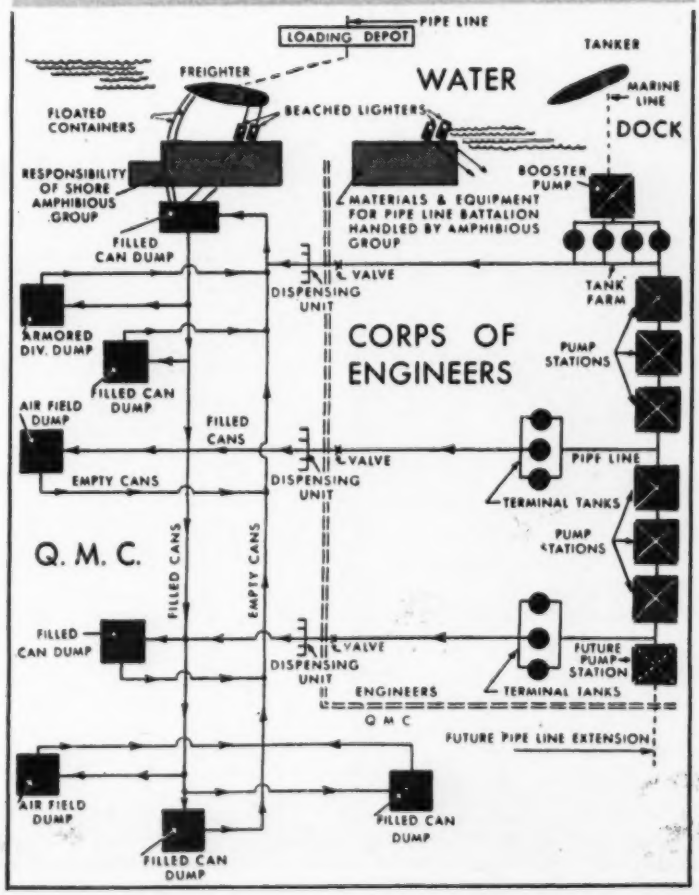
VICTAULIC

Reg. U. S. Pat. Off.

Self-Aligning Pipe Couplings and Full Flow Fittings

Victaulic Company of America, 30 Rockefeller Plaza, New York 20, N. Y.

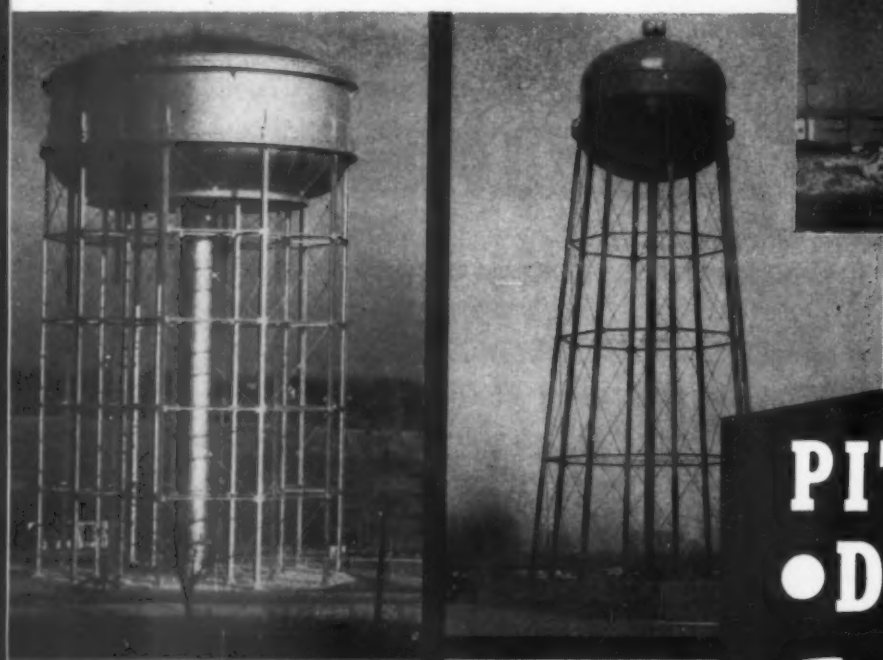
How a modern beachhead is supplied with fuel for armored and air forces.



OIL MINING MARINE MUNICIPAL INDUSTRIAL

50 Years of Service TO THE AMERICAN MUNICIPALITY

YOUR SOUND ASSURANCE OF PROFITABLE COUNSEL IN PLANNING NOW FOR POSTWAR WATER STORAGE IMPROVEMENTS



PITTSBURGH •DES MOINES

Elevated Steel Tanks

As the war years point up the necessity of improvements in your municipal water supply for the future, your planning should be current—ready now, for execution as soon as conditions permit. Our complete experience and engineering assistance is available to your planning group—we'll be glad to consult with you!

PITTSBURGH·DES MOINES STEEL CO.

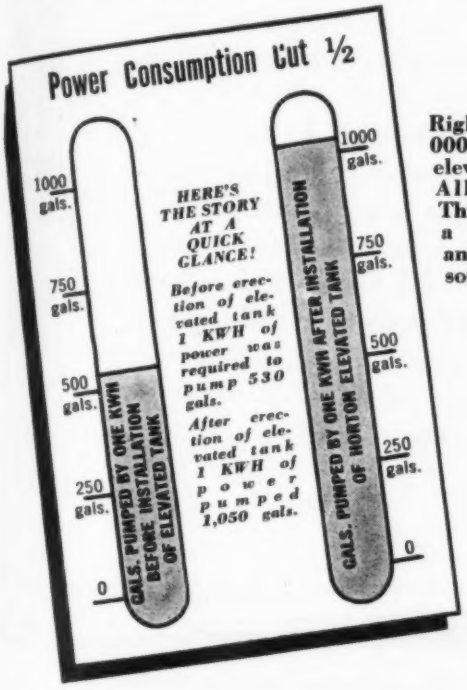
PITTSBURGH, PA., 3418 NEVILLE ISLAND—DES MOINES, IOWA, 919 TUTTLE STREET
NEW YORK, ROOM 921, 218 BROADWAY · CHICAGO, 1222 FIRST NATIONAL BANK BUILDING
DALLAS, 1223 PRAETORIAN BUILDING · SAN FRANCISCO, 625 RIALTO BUILDING
SEATTLE, 526 EIGHTH AVENUE, SOUTH

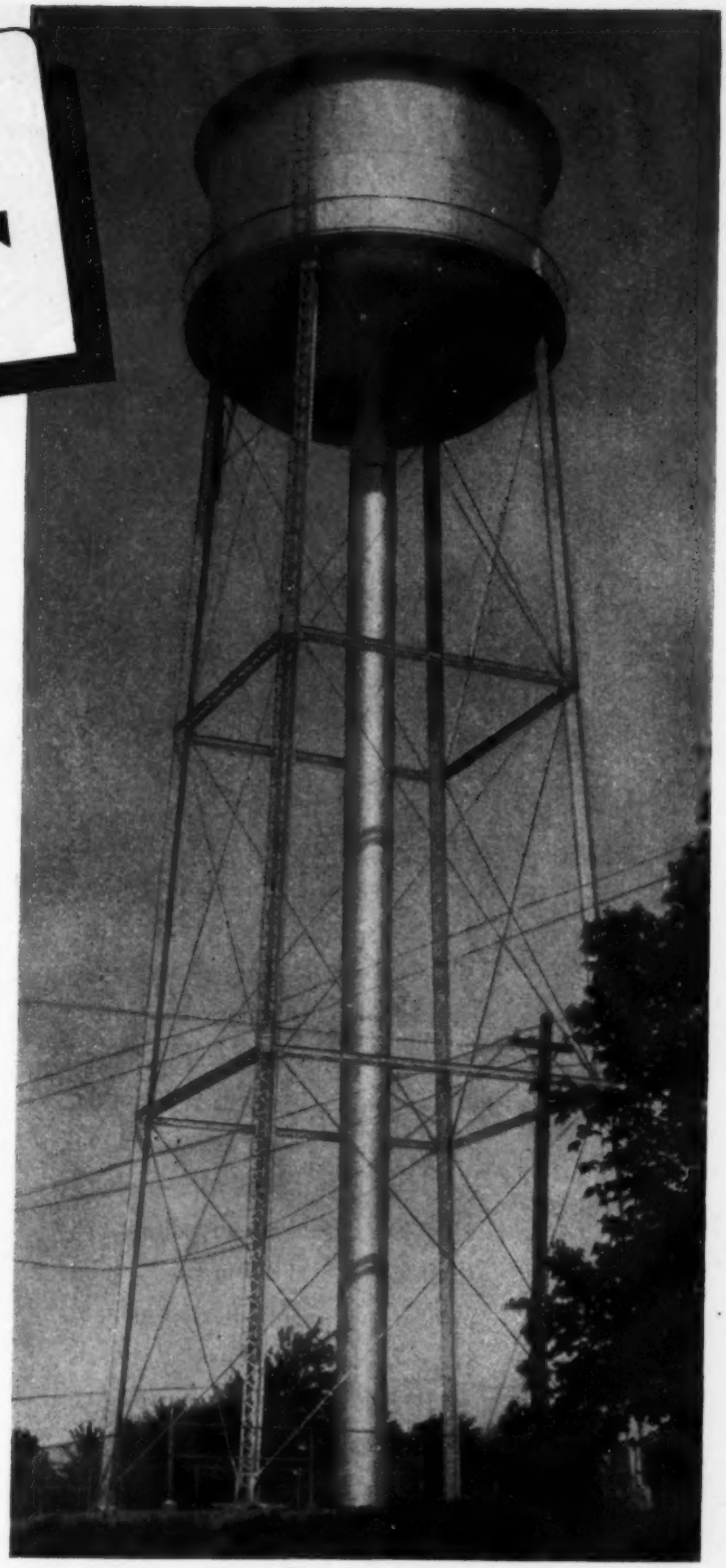
CASE No. 12

HOW ELEVATED STORAGE EFFECTS POWER CONSUMPTION AND POWER COST

One of the most appealing advantages provided by Horton elevated storage is the savings in power consumption and subsequent savings in power costs.

The experience of Albion, Ind., with elevated storage serves as a concrete example of this. Prior to the installation of the 50,000-gal. Horton elevated tank, water consumption in Albion was approximately 50,000 gals. per day. The power used was about 1 KWH for 530 gals. After the installation of the elevated tank pumping was approximately 1 KWH for 1,050 gals., amounting to an actual reduction in power consumption of one-half. Considering the original cost of the tank, this saving in power costs alone will pay for the tank in less than 15 years.


Power Consumption Cut ½
1000 gals.
750 gals.
500 gals.
250 gals.
0
GALS. PUMPED BY ONE KWH BEFORE INSTALLATION OF ELEVATED TANK
HERE'S THE STORY AT A QUICK GLANCE!
Before erection of elevated tank 1 KWH of power was required to pump 530 gals.
After erection of elevated tank 1 KWH of power pumped 1,050 gals.
GALS. PUMPED BY ONE KWH AFTER INSTALLATION OF HORTON ELEVATED TANK
1000 gals.
750 gals.
500 gals.
250 gals.
0



Right: The 50,000-gal. Horton elevated tank at Albion, Ind. This unit has a cone roof and an ellipsoidal bottom.

● *For more than 50 years we have been designing, fabricating and erecting elevated water storage tanks. In addition to ellipsiodal-bottom tanks like the one above we also fabricate radial-cone bottom structures of large capacity with a small range in head; and Waterspheres (spherical tanks supported on a cylindrical column). Write our nearest office outlining your needs.*

CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Havana.....402 Edificio Abreu
Birmingham 1.....1586 North 50th Street
Plants in Birmingham, Chicago and Greenville, Pennsylvania

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Drive
Philadelphia 3.....1644-1700 Walnut Street
Washington 5.....330 Bowen Bldg.
San Francisco 5.....1083 Rialto Bldg.
In Canada: Horton Steel Works, Limited, Fort Erie, Ont.

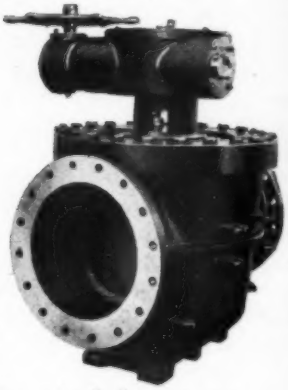
When Blueprinting for Tomorrow— particularly, the handling and controlling of Water and Sewage— plan to use

SMITH AXIAL-FLOW PUMPS *and* FREE FLOW ROTOVALVES

The Automatically Adjustable Blade Impeller Axial Flow PUMP

DESIGNED to meet water pumping and controlling needs. Adopted by leading engineers and officials in modern waterworks, sanitation plants, and flood control systems. Available with either fixed or automatically adjustable blades—which vary the discharge by changing their pitch while the pump is in operation—particularly, advantageous for low varying heads and high volume requirements. Write for Bulletin 142.

The Free Flow ROTOVALVE



A CONE-type plug valve with full circular opening, thus assuring free flow and losses no greater than in a pipe of equal length and diameter, and with operating mechanism that will lift, rotate and reseat the valve plug. Adaptable for hydraulic, motor, manual, or pneumatic operation. A one-type, multiple-purpose valve for all water and sewage uses obtainable by merely changing the control mechanism, or the actuating means. Full details in Bulletin 140. Send for it!

Enjoy the full benefits of efficiency in operation tomorrow by planning wisely, today. Profit by our 69 Years of Experience in Hydraulics! Put your problems up to us!

S. MORGAN SMITH Co.

YORK, PENNA. U.S.A.

Modern water works practice is typified by Worthington installations throughout the world

Worthington equipment for water supply comprises a most comprehensive line . . . . not only main units of every type and size, and for every type of drive, but all auxiliary equipment . . . . a complete service with undivided responsibility

CENTRIFUGAL PUMPS
STEAM, POWER AND ROTARY PUMPS
TURBINE WELL PUMPS
DIESEL ENGINES
GAS ENGINES
CONVERTIBLE GAS-DIESEL ENGINES
FEEDWATER HEATERS AND DEAERATORS
AIR COMPRESSORS
PORTABLE COMPRESSORS AND AIR TOOLS
REDUCING AND INCREASING GEARS
MULTI-V-BELT DRIVES
STEAM TURBO-GENERATOR UNITS
MULTI-STAGE STEAM TURBINES
SINGLE-STAGE STEAM TURBINES
COMBINED STEAM TURBINE AND REDUCING GEAR UNITS
STEAM CONDENSERS
STEAM-JET EJECTORS
WATER SOFTENERS
PRESSURE FILTERS
ROCK DRILLING EQUIPMENT
WATER METERS*

*A complete line of water meters of every type is manufactured by Worthington-Gamon Meter Company, a subsidiary of Worthington Pump and Machinery Corporation

WORTHINGTON

JC9-21

IN YOUR POST WAR PLANNING

Remember—

The INFILCO Equipped Water Purification Plant CENTRALIZES EQUIPMENT RESPONSIBILITY AND ASSURES COORDINATED RESULTS

You are invited to make use of the experience gained by Infilco during the 40-odd years of designing and manufacturing every type and size of water purification equipment.

In furnishing everything required for water conditioning—from Accelators to Zeolites—Infilco offers you the important advantage of undivided responsibility for successful equipment operation.

And—your plant will be in step with modern developments, because Infilco has always been the first to introduce and adopt worthwhile improvements, as well as first to discard anything proving to be a hindrance to progress.

The services of its staff of experienced engineers and laboratory facilities are at your disposal for the asking.

INFILCO

INCORPORATED

325 W. 25TH PLACE • CHICAGO, ILL.

INFILCO

PRODUCTS

- Accelators
- Aerators
- Automatic Controls
- Chemical Feeders
- Clarifiers
- Coagulators
- Digesters
- Dosing Siphons
- Filter Equipment
- Flow Controllers
- Flow Gauges
- Fluorex Purifiers
- Gravity Filters
- Hydraulic Controls
- Hydraulic Switches
- Hydrodarco Purifiers
- Level Controls
- Lime Slakers
- Loss of Head Gauges
- Mixing Equipment
- Pressure Filters
- Proportioners
- Recarbonators
- Rotary Distributors
- Samplers
- Settlers
- Sewage Activators
- Sewage Equipment
- Sewage Griductors
- Venturi Tubes
- Wagner Underdrains
- Water Filters
- Water Softeners
- Zeolites

INSURES PALATABLE
NUCHAR
AQUA
DRINKING WATER

...it all adds up to Palatable Water—

Superior activation + finer carbon particles + increased porosity + greater dispersion + better suspendability = Aqua Nuchar = more palatable water.

Aqua Nuchar Activated Carbon, because of its microscopic fineness, has amazing ability to remove by adsorption the tastes and odors that affect your water supply. The extraordinary porosity of Aqua Nuchar not only results in greater adsorption because of the larger surface area exposed, but also accounts for its superior properties of dispersion and suspendability—all of which adds up to more palatable water.

Taste and odor problems arise overnight—a spill from an industrial plant or sudden growth of algae result in vile tastes and odors in your raw water supply. To guard against delays, stocks of Aqua Nuchar Activated Carbon are spotted at strategic points throughout the country for prompt delivery.

BLUEPRINT NOW!

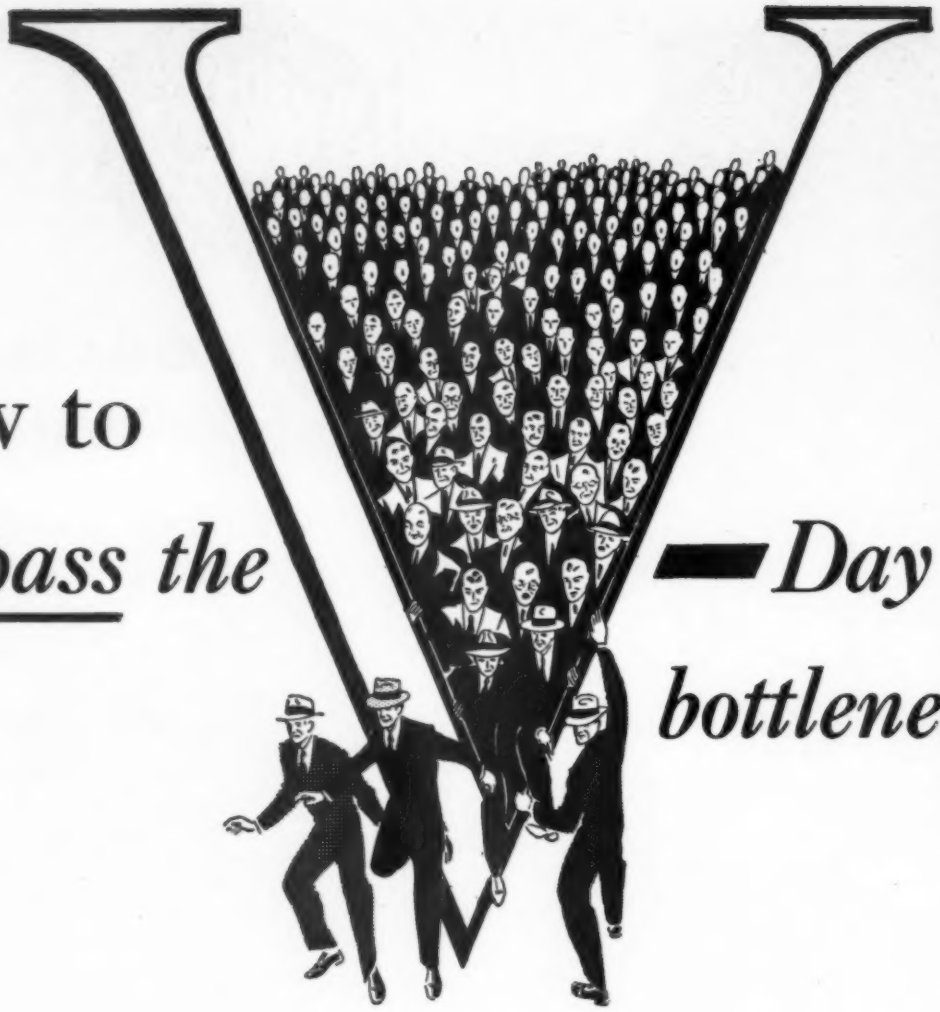
But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR AQUA

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. | 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS | 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. | 844 LEADER BLDG., CLEVELAND 14, OHIO



How to *by-pass the* V-Day *bottleneck*

IT WON'T be long now. In fact, it may have happened before this message is published. But, in any case, remember this . . . when priorities are lifted there's going to be a rush for equipment of all types and there's bound to be a bottleneck.

If it's water conditioning equipment you need, this bottleneck can be by-passed. You can get all the preliminary work done now . . . the designing, engineering, estimating that takes weeks and months . . . and be ready for production on V-Day.

Yes, Graver will send a water conditioning engineer to sit in with your planning board. His knowledge and broad experience in handling water conditioning problems of all types are at your service. He will analyze your raw water supply . . . make unbiased recommendations as to the type of equipment best suited to the job . . . supply preliminary drawings . . . and submit complete estimates.

Think what that means to you. Your preliminary work is done . . . you're in line for immediate production when restrictions are lifted . . . while the less foresighted are just getting started.

We're ready to serve you. Your request for a consultation with a Graver engineer incurs no obligation. Let's get started . . . today.

Process Equipment Division
of

GRAVER TANK & MFG. CO., INC.

4809-43 Tod Ave., East Chicago, Ind.

NEW YORK CATASAUQUA, PA. CHICAGO TULSA

GRAVER

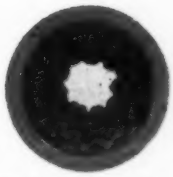
WATER CONDITIONING EQUIPMENT

Hot Process Water Softeners • Zeolite Water Softeners • Water Filters • Iron Removal Filters • Oil Removal Filters • Taste and Odor Removal Filters • Swimming Pool Equipment • Reactivators • Chemical Feeding, Mixing, and Proportioning Equipment • Sewage Treatment Equipment.

WHEN VICTORY COMES..

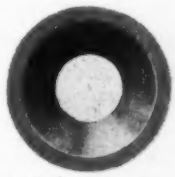
AFTER Victory comes the demand for *water supply* will be greater than ever before, but few can predict how great this demand will be. New mains will take up some of the load—but it will be the *mains already in the ground* that must bear most of the burden. Many of these mains are so clogged and of such reduced capacity that it will be impossible to bring a full supply of water where most needed. That is why waterworks officials all over the country are calling upon NATIONAL WATER MAIN CLEANING COMPANY to help them provide adequate water supply for the postwar period.

By effectively cleaning all clogged mains and returning them to full usefulness, the NATIONAL METHOD not only prepares the mains for postwar demands but also saves time and money—as hundreds of satisfied clients can testify.



Before Cleaning

The NATIONAL METHOD



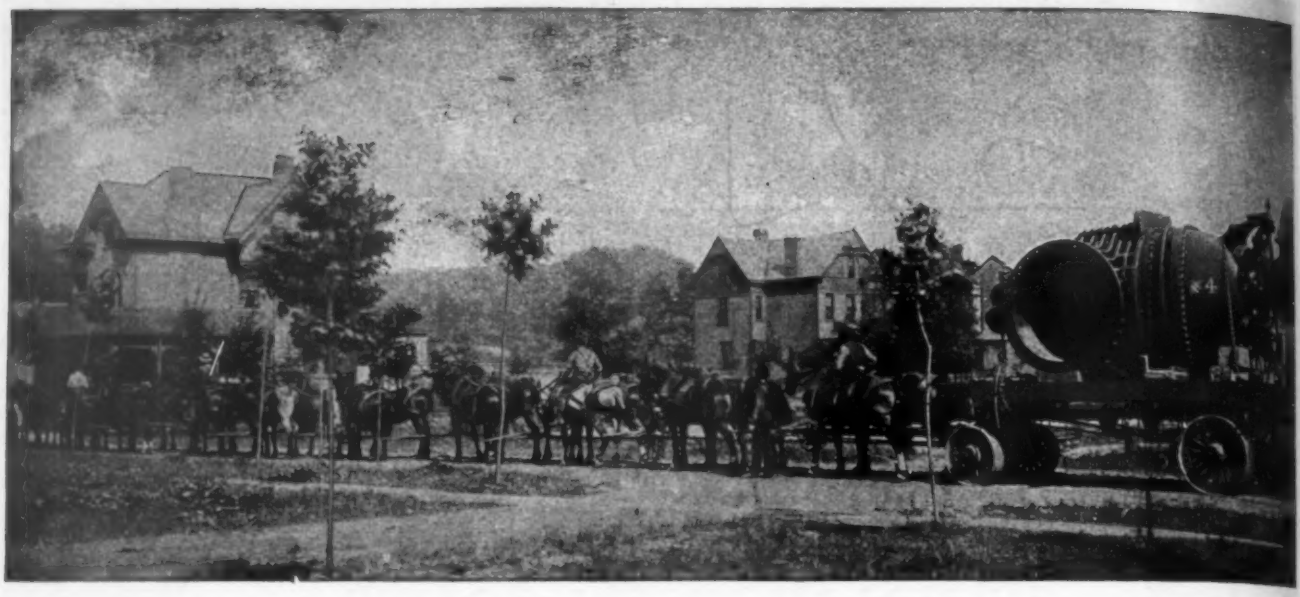
After Cleaning

The National Water Main Cleaning Co.

30 Church St. **New York**

BRANCHES

115 Peterboro St., Boston 15, Mass.
Mortgage Guarantee Bldg., Atlanta 3, Ga.
205 W. Wacker Dr., Chicago 6, Ill.
3812 Castellar St., Omaha 5, Neb.
7103 Dale Ave., St. Louis 17, Mo.
3707 Madison St., Kansas City 2, Mo.
2028 Union Ave., Montreal, Canada
576 Wall St., Winnipeg, Canada
P. O. Box 683, Jacksonville, Fla.



From our archives a reminder that

50 YEARS IS NOT SO LONG!

when speaking of the "life expectancy" of Rensselaer Valves.

Referring to the above picture, our catalogue of 1896 stated:

"THE SCENE is from a photograph taken in the village of Sharpsburg, near the city of Allegheny, Pa., and illustrates the method of transportation required to transfer one of the NINE MAMMOTH FIVE-FOOT VALVES furnished that city by the RENSSELAER MANUFACTURING COMPANY, from the railroad to its position in the trenches. Each valve weighed 50,000 pounds (25 tons), and required twenty-four heavy draft horses, and a truck built specially to transport them.

"They were the LARGEST AND HEAVIEST VALVES EVER BUILT IN THE WORLD, which record has never been equalled except by ourselves when building the MAMMOTH SIX-FOOT VALVE, for the Pioneer Electric Power Company, Ogden, Utah. (Illustrated, pages 102 and 103), which weighed 52,000 lbs. (26 tons)."

"Quality is remembered long after the price is forgotten"

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The pressure loss through a Venturi Tube, and thus the cost of pumping or the retardation of gravity flow, is much less than incurred by an orifice plate or conventional flow nozzle producing equivalent differentials.

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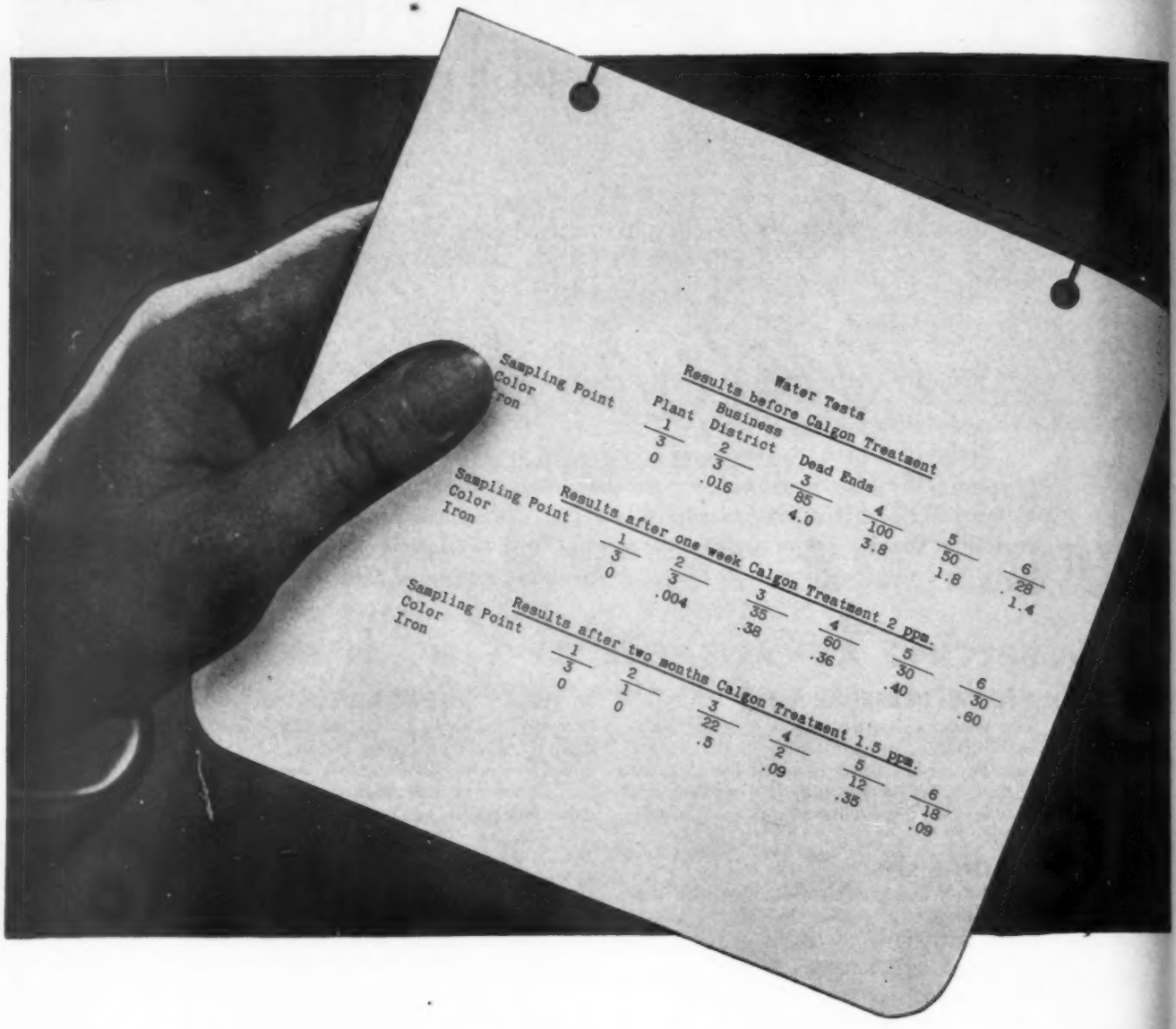
Calgon *controls corrosion* at Bristol, Conn.


Water Tests
Results before Calgon Treatment
Sampling Point 1 2 3 4 5 6
Color 3 3 3 85 100 50 28
Iron 0 .016 4.0 3.8 1.8 1.4
Plant
Business District
Dead Ends
Results after one week Calgon Treatment 2 ppm.
Sampling Point 1 2 3 4 5 6
Color 3 3 35 60 30 30
Iron 0 .004 .38 .36 .40 .60
Results after two months Calgon Treatment 1.5 ppm.
Sampling Point 1 2 3 4 5 6
Color 3 1 22 2 12 18
Iron 0 0 .5 .09 .35 .09

CORROSION and "red water" used to be a serious problem at Bristol, Connecticut. They had a new all-steel filter plant and were using the usual methods of water purification; namely aeration, alum and soda ash treatment, followed by mixing, coagulation and filtration. Raw water was soft, low in alkalinity and mineral matter. Post lime treatment was used to control "red water."

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93% REMOVAL OF 5-DAY B.O.D.
76% REMOVAL OF SUSPENDED SOLIDS
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WATER WORKS & SEWERAGE

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L. H. Enslow, Editor

COMING!

Gas Engine Performance and Economics

Is an account of the dependable performance, operating experiences and economy of sludge gas engines serving the sewage treatment works of Marion, Ind. Four years of operation of this modern plant, under supervision of a wide-awake young superintendent with universally complete records, is ample proof once more of the attractive economics of gas engines in modern sewage works operation. The record is set forth by—

DAVID BACKMEYER, Supt.,
Sewage Treatment Works, Marion, Ind.

Cathodic Protection

Is to our thinking a topic deserving of more study and greater consideration as a corrosion suppression measure of marked potentialities and wide application. Having learned of recent investigations and exact studies of the process in laboratory and field, which confirm or refute earlier conceptions of the process and throw new lights on the potentialities and limitations of this electrolytic anti-corrosion measure, arrangements have been made for a series of articles by a well grounded electrochemical engineer whose practical and research experience with the cathodic processes makes him well qualified to discuss theory, experimental evidence and practice in a highly revealing manner. He is—

LEE P. SUDRABIN, Chemical Engr.,
Electro Rust-Proofing Co., Dayton, Ohio.

The Value of Sewage Treatment Plant Records

Has been nowhere better proven than at Kenosha, Wis., where used to advantage not only in plant control but also in connection with a court case regarding the presence of copper bearing wastes in the sewage, causing cessation of proper digestion of the sludge. This case, now before the Wisconsin Supreme Court, has received nation-wide attention. The story of the case, and the part that plant records played, comes from—

H. D. RUDGAL, Sup't.
Sewage Treatment Works, Kenosha, Wis.

Deep Well Pumps and Pumping

Is an erudite discussion of the important topic of design, construction and selection of deep well centrifugal pumps for dependable and economical service under various conditions. This article is thought to be the best that has ever been developed on this subject by the author, a pump designer with long experience to his credit in shop, testing laboratory and in the field following up service and performance of deep well centrifugals of various designs, characteristics and materials. Those who have studied earlier articles by this author will be watching for this one by—

AXEL O. FABRIN, Chief Engr.,
Lane & Bowler, Inc., Memphis, Tenn.

Wartime Reconstruction of a Water Plant

The story of reconstruction and enlargement of the water plant at Williamson, N. Y., under wartime restrictions is told by—

A. BRADFORD SQUIRE,
Wm. S. Lozier, Engrs., Rochester, N. Y.

Combined Water and Sewage Plant Operation in a Small Town

Is the story of the development of water softening and installation of sewage treatment under a plan of self-liquidation and P.W.A. The recounting of operating and management problems that have ensued with joint operation, as told to our Associate Editor, comes from—

RUBE BLYSTONE, Supt.,
Water Works & Sewerage, Sullivan, Ill.

Reminiscences of a Water Works Engineer

Is but one chapter in the story of a man who "had spent most of his life making machines work for a man." It is a chapter of the story of that life that was being written when the author passed away leaving completed only a small part of the work contemplated by the late "Dean of Water Works Operators" in Illinois—

MARTIN M. SYMONS, Late Chief Engineer,
Interstate Water Co., Danville, Ill.

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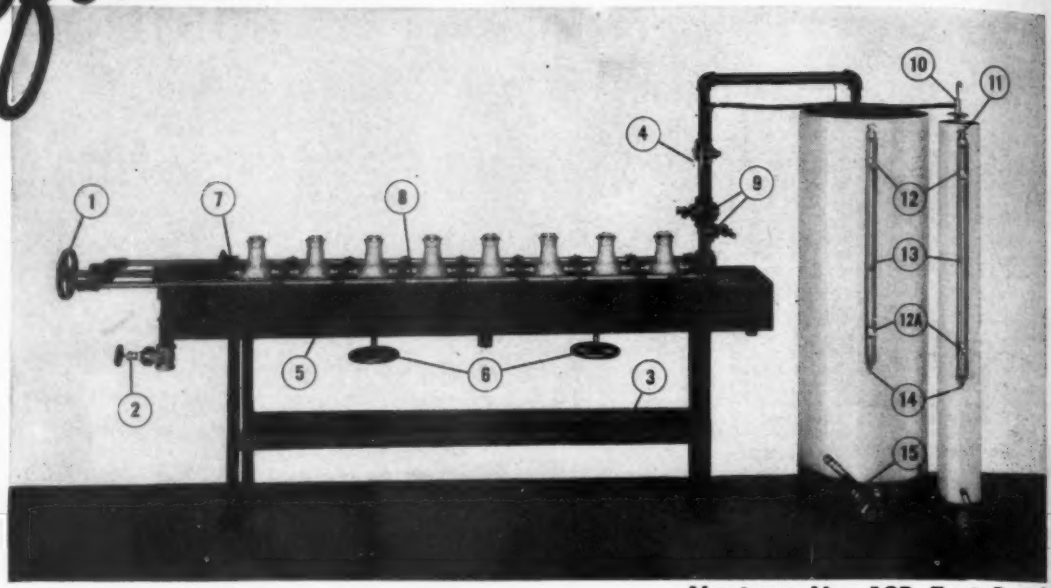

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Neptune Test Benches have been brought well within the means of any Water Department. The bench, the tanks, the rate of flow indicator and the controls have been made of the highest quality materials available, and yet have been kept simple and inexpensive in design. Everything for easy, accurate and rapid testing of meters has been incorporated.

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A SIZE FOR EVERY REQUIREMENT

TABLE SHOWING NUMBER OF BENCH WITH SIZE AND NUMBER OF METERS FOR WHICH TEST FITTINGS ARE PROVIDED

Bench No.	Capacity of Bench in number of Meters						
	⅝	⅝ x ¾	¾	¾ x 1	1	1½"	2"
15	2	2	2	2	1	1	1
16	4	4	4	4	3	0	0
16B	4	4	4	4	3	2	2
17	6	6	5	6	5	0	0
17B	6	6	5	6	5	3	3
18	8	8	7	7	6	0	0
18B	8	8	7	7	6	5	4
19	10	10	9	9	8	0	0
19B	10	10	9	9	8	6	5

105

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WATER WORKS & SEWERAGE

VOL. 91. No. 9 *A Gillette Publication* SEPTEMBER, 1944

BENEFITS FROM MODERN SEWERAGE SYSTEMS

An Exposition of Successful Methods of Educating the Public to the Need for and Benefits from Modern Sewerage Systems and Treatment Works

BY M. W. LOVING

Engineer-Consultant*

CHICAGO, ILL.

The Author

BASED on experience and recorded facts, it can be said with some emphasis that, before a sewerage facility can be designed and constructed, the people who will benefit from the improvement, while also paying the assessments for its design and construction, must be fully informed on the necessity for such improvement in the locality in which they reside.

It is hardly necessary to add that most of the taxpayers in any city, large or small, are reluctant to have their tax bill increased unless they are fully informed of all aspects of the case. But once the citizens are made to realize the true benefits by eliminating unsanitary conditions, they will approve and support a plan that will solve their sewerage problems.

For more than a century, people living in congested cities and districts of the country have often been content with, or rather tolerant of, very unsatisfactory conditions. Washington, D. C., did not get around to modernizing and completing its sewerage system—especially the treatment of sewage—until 1935-38. Like many other cities, funds for design and construction were not made available until the days of the P.W.A., when loans and grants from our "Uncle Samuel" became available.

Atlanta, Ga., installed a modern sewerage system in 1936-40 through the aid of P.W.A. loans and grants and W.P.A. This system had been badly needed for more than 20 years. Chicago, New Orleans, New York, Buffalo, Detroit, Los Angeles and many other cities and towns throughout the country built sewerage systems —in part, between 1933 and 1943.

Engineers of the State Departments of Health and the U. S. Public Health Service are qualified by knowledge and experience to keep the public fully informed, especially in cases of gross pollution and unsanitary conditions. Indeed, these engineers do everything in their power to persuade public officials of cities and towns to design and construct modern sewerage systems including sewage treatment plants, but results under normal conditions are slow. Technical articles seldom make an impression on a city councilman because he does not understand them. The engineer should prepare clear-cut, informative publicity material that can be readily understood by the average taxpayer. It is generally desirable to prepare a drawing in perspective so that the reader can visualize the extent and nature of the proposed improvement. Simple questions and answers are very effective. Once the citizens and the public officials who are not engineers understand the engineer's report and recommendations, they will usually support and aid in initiating the project. Therefore, educational groundwork is an all-important consideration.

SOME OUTSTANDING PROJECTS

Because sewerage improvements will, in all probability have to be locally financed in the post-war era, it may be interesting to engineers and others to know how three outstanding sewerage projects were initiated and finally designed and constructed:

1. **The County Sanitation Districts of Los Angeles County,** California, constructed from 1925-38, facilities costing $13,300,000.

2. **The Minneapolis-St. Paul Sanitary District,** St. Paul, Minnesota, constructed 1934-1938, facilities costing $16,000,000.

3. **The Baltimore Sewerage Commission,** Baltimore, Maryland, constructed 1906-16, facilities costing $23,000,000.

The Sanitation Districts of Los Angeles County

The County Sanitation Districts of Los Angeles County was conceived and its design and construction consummated by the late A. K. Warren, then Chief Engineer, and his principal assistant, A. W. Rawn, who is now Chief Engineer and General Manager. Mr. Warren visited Chicago in the summer of 1926 and I was privileged to accompany him on an inspection of the construction projects of the Sanitary District of Chicago. He gave me a map in perspective of Los

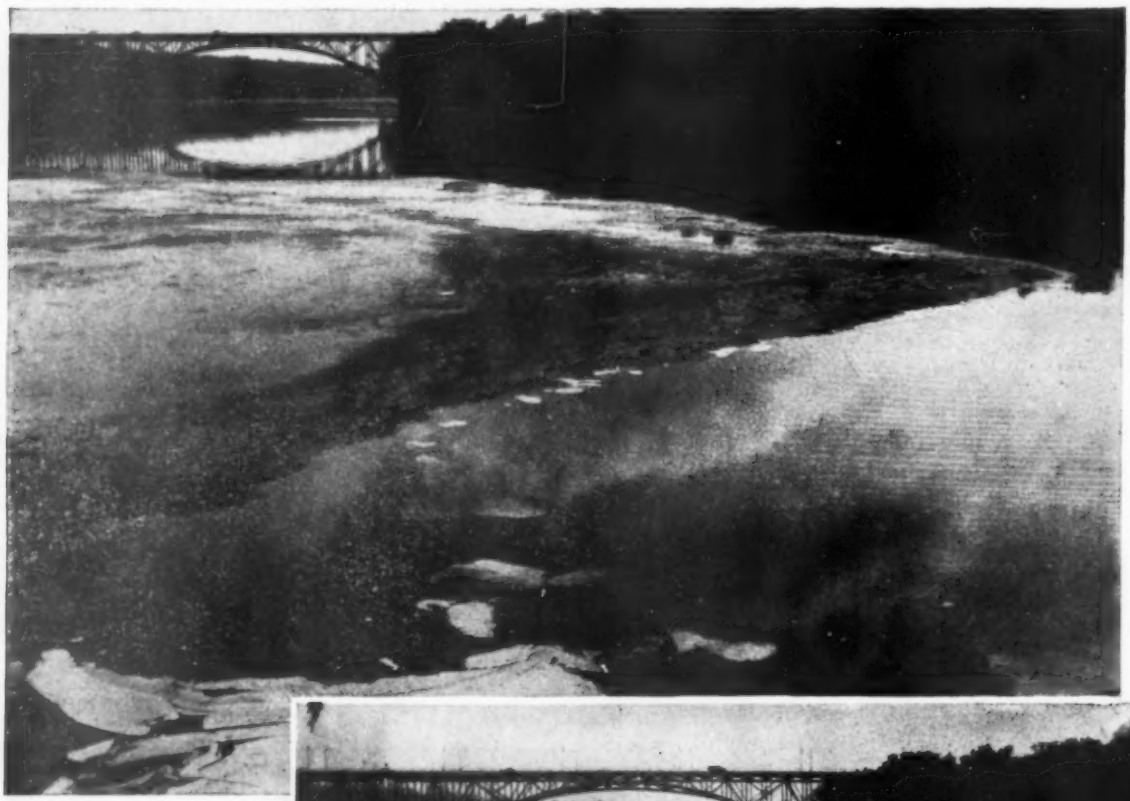
*The author, who has developed this timely article at the request of *Water Works & Sewerage*, has long served as executive secretary of the American Concrete Pipe Assn. and as consulting engineer to the Portland Cement Assn. and manufacturers of concrete pipe.—Editor.

Angeles County and a set of 44 questions and answers that he and Mr. Rawn had prepared for the public, entitled "Facts Concerning County District No. 5, Bond Election to Be Held February 24, 1925." The map accompanies this article, and as many of the accompanying questions and answers are reproduced as the editor of *Water Works & Sewerage* will publish. All of the questions and answers are clear-cut and to the point. Considering the fact that 7 municipalities constitute a part of this sanitary district, it was a remarkable achievement to persuade public officials and citizens of so many different towns to collaborate in solving their mutual problem.

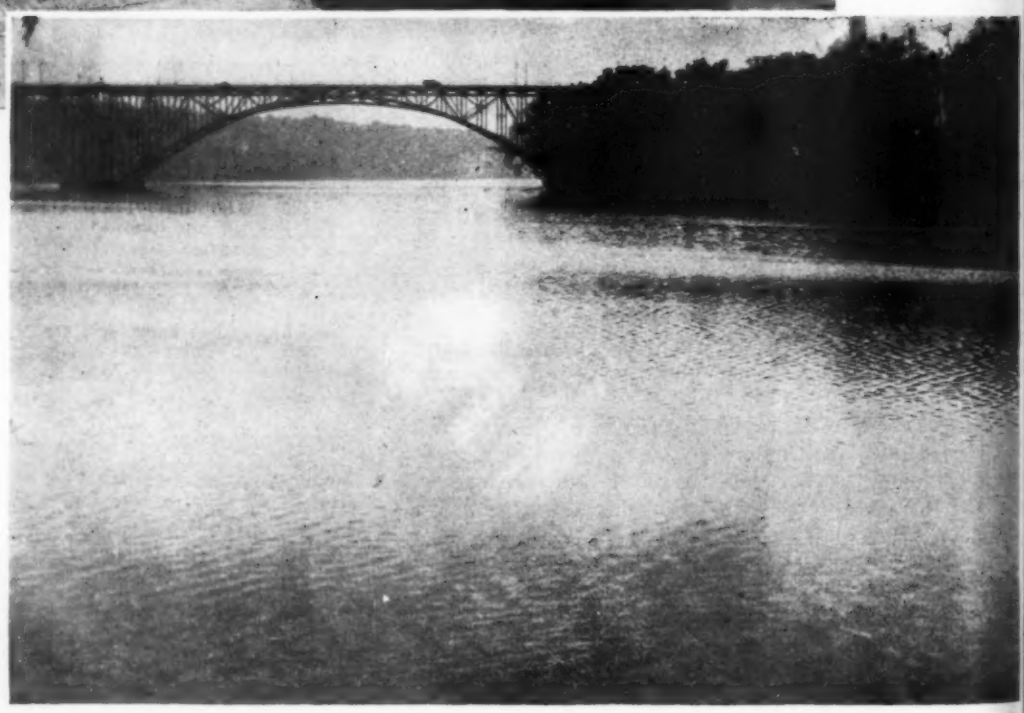
Specimen Questions and Answers

The following are specimen "questions" and a few of the "answers" used in the Los Angeles County program of informing the taxpayers prior to all bond elections:

1. Q.—What is Sanitation District No. 5 and for what purpose was it formed?
10. Q.—What is the plan?
13. Q.—What is the outfall sewer?
14. Q.—What treatment will the sewage receive?
15. Q.—What effect will this method of disposal have on the bathing beaches of the County?
20. Q.—What will be the cost of construction to District No. 5?
    A.—($2,000,000.)
26. Q.—How will this money be raised?
    A.—(A bond issue must be voted.)
29. Q.—How will these bonds be paid off?
    A.—(In 40 equal annual payments.)
30. Q.—What rate of interest will the bonds bear?
    A.—(5½% until retired.)



The "Father of Waters"
And how the Twin Cities treated a magnificent waterway before sewage treatment.

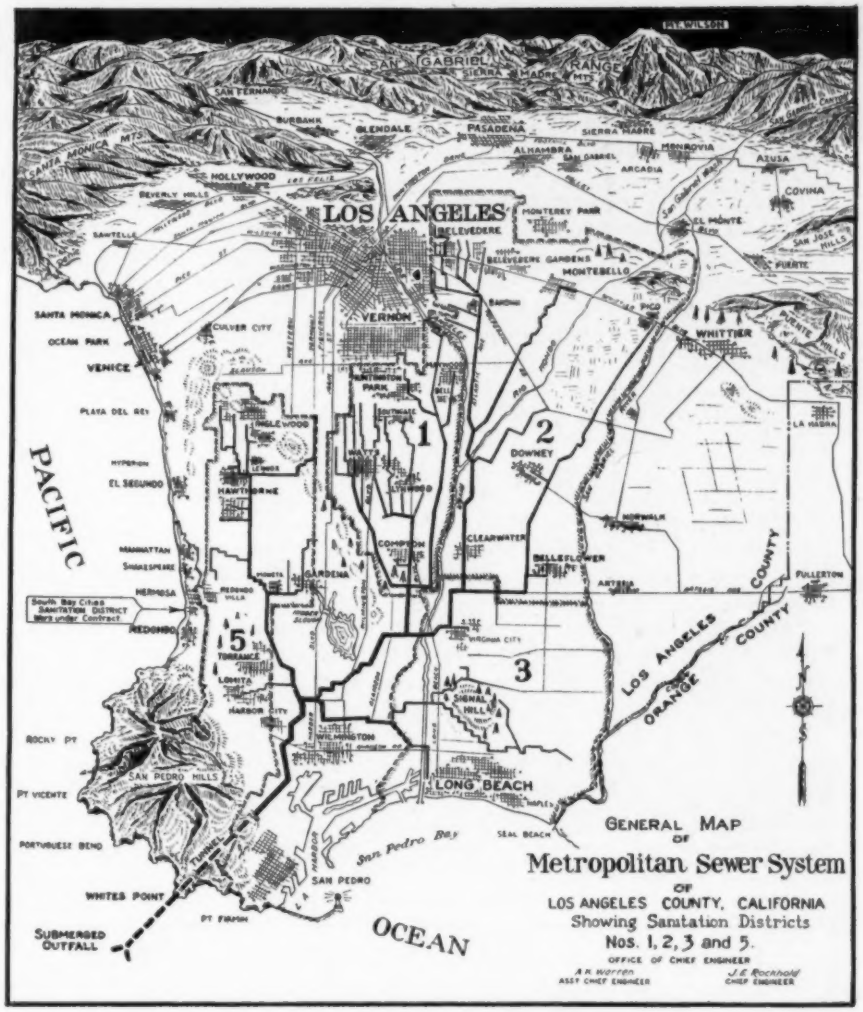


A Different Mississippi
After the first summer of treatment, a stream once again fit for recreation.

31. Q.—What will be the annual cost of operation and maintenance?
    A.—($35,000 or less per year.)
32. Q.—What will be the annual cost to property owners for construction, operation, maintenance and depreciation of the system?
    A.—(The answer to this question is rather detailed, but clear, as to what each $100 worth of assessed value of real property would be charged during the 40-year life of the bonds. The assessment began at 34 cts per $100 valuation, sliding gradually down to 10 cts in the 20th year and diminishing thereafter to meet mere operation and maintenance charges. The cost was also presented on the basis of the average assessed home value, starting in 1926 at $8.25 per year and sliding down to $2.50 for the 20th year. So there was no guessing by the prospective voter as to what the "bill" was to be.—ED.)
33. Q.—How do these costs compare with the cost of cesspools?
    A.—(Less than cesspools even in the first and highest cost years. The sewer costs slide downward while cesspool costs increase with years of service.)
39. Q.—Are the reports and recommendations of the chief engineer open to public inspection, and where?
41. Q.—What majority is necessary for the bond election to carry?
    A.—(A two-thirds majority is necessary.)
42. Q.—When will the work be started?
43. Q.—When will the complete system be ready for use?
44. Q.—Who are some of the endorsers of the plan amongst the engineering fraternity of southern California?
    A.—(Here a lengthy list of the best known city engineers in southern California is presented as having constituted an impartial "board" to review and pass on the merits and soundness of the proposed improvements—to our thinking a very strengthening procedure, equivalent to the patron list which sells other community projects to the public.—ED.)

[It is regretted that the space situation prevented printing the entire 44 questions and complete answers. Perhaps copies of these "Folders of Facts" could be had by communicating with The County Sanitation Districts of Los Angeles County, 110 South Broadway, Los Angeles 12, California.—ED.]

In 1942 I visited Los Angeles and asked Mr. Rawn this question: "Do the people of Los Angeles County realize what this great improvement means to them today?" He told me then what he said in his letter dated June 23, 1944, quoted herewith in part:



Map of sewer system of Los Angeles County Sanitation Districts used in public educational program with 44 questions and answers printed on the rear of the map for the elucidation of those who will vote on the issuance of bonds.

"Had it not been for the County Sanitation Districts and the far-sightedness of those who originally organized them, wrote the law and promoted their construction, the south metropolitan area of Los Angeles County would have been in a state of abject chaos during the greatly accelerated expansion of the last five years. Local disposal in the area would never have solved the problem, and piecemeal construction of a sewerage system would have yielded nothing other than negative dividends. Had the cities and county awaited the advent of this period of expansion before going to work on the sewerage system, I have no slightest doubt but that the problems of sanitation would have been almost insurmountable. To have had to plan, finance and construct the Districts' work during that period of expansion would have so interfered with the war effort that it just doesn't seem as though it would have been possible.

"In all, the Districts' bond issues so far have approximated $10,800,000. To this must be added about a million and a half dollars in federal funds granted through the last twelve years and, in order to complete the full capacity of all of the elements in the system capable of expansion, add another million dollars—and that's about the story—and in the absence of the most unusual conditions, will carry the sewerage of the area forward to about the last quarter of this century.

"When we commenced the job of organizing the Sanitation Districts, we went into a huddle (Warren and I) and decided that if humanly possible we would place authentic, honest information before the voters in the Districts as well in advance of the false statements bound to be circulated, as we could. To do this, we earnestly solicited opportunities to talk to all types and characters of associations and we also prepared questionnaires for each of the Districts, all similar in character to the one herewith enclosed.

"The questionnaires were sent to every registered voter in the District far enough in advance of election or of the proceedings to permit him, if he would, to draw his own conclusions about the merit of the job. In addition, we spoke every place, before all types of service clubs, women's clubs—I even addressed the congregation of a negro church and held some meetings at the county poor farm, where they can't pay their own freight but are still entitled to vote. It got so that some public officials stated that wherever they saw a light and more than four people collected at night, they could be sure that either Warren or I was there talking about sewers. It was that kind of publicity which helped us immeasurably; hard work, but *facts honestly presented* and with all of the story told *in a manner which could not and did not backfire.* [The italics are mine.—M. W. L.]

Mr. Rawn sent me a mimeographed report and map dated July, 1942, entitled "Organization Function of the County Sanitation Districts of Los Angeles County." This crystal-clear document should be read by every engineer interested in or concerned with sewerage, especially the public relations angle.

The Minneapolis-St. Paul Sanitary District

The Minneapolis-St. Paul Sanitary District, organized on November 1, 1933, under an act—Chapter 341, Minnesota Session Laws of 1933—succeeded the Metropolitan Drainage Commission, organized in 1927. The Twin Cities are located on the Mississippi River about 475 miles below its source in a chain of lakes. The river enters Minneapolis—see map—at an elevation of about 802 (sea level datum) and has a fall of about 70 ft. near the business center of Minneapolis at St. Anthony Falls, below which there is a short stretch of swift water. About six miles below St. Anthony Falls there is another drop of 33 ft. to an elevation of about 690 just below the Twin City Lock and Dam. Upstream of this dam there is a pool of quiet water about 5.5 miles in length.

The discharge of the Mississippi River in its course through the Twin Cities ranges from an estimated maximum of 120,000 C.F.S. to a record minimum of 864 C.F.S. in August, 1934.

Gross pollution of the river may be visualized from the following quotations from the Metropolitan Drainage Commission Third Report, 1929 and 1930:

"Review: The previous reports for 1927 and 1928 contain information relative to the organization of the Metropolitan Drainage Commission and its activities during those years, also a comprehensive report by the Minnesota State Board of Health on the pollution of the Mississippi River.

"The following from the summary and conclusion of the 1928 report outlines the magnitude and seriousness of the problem:

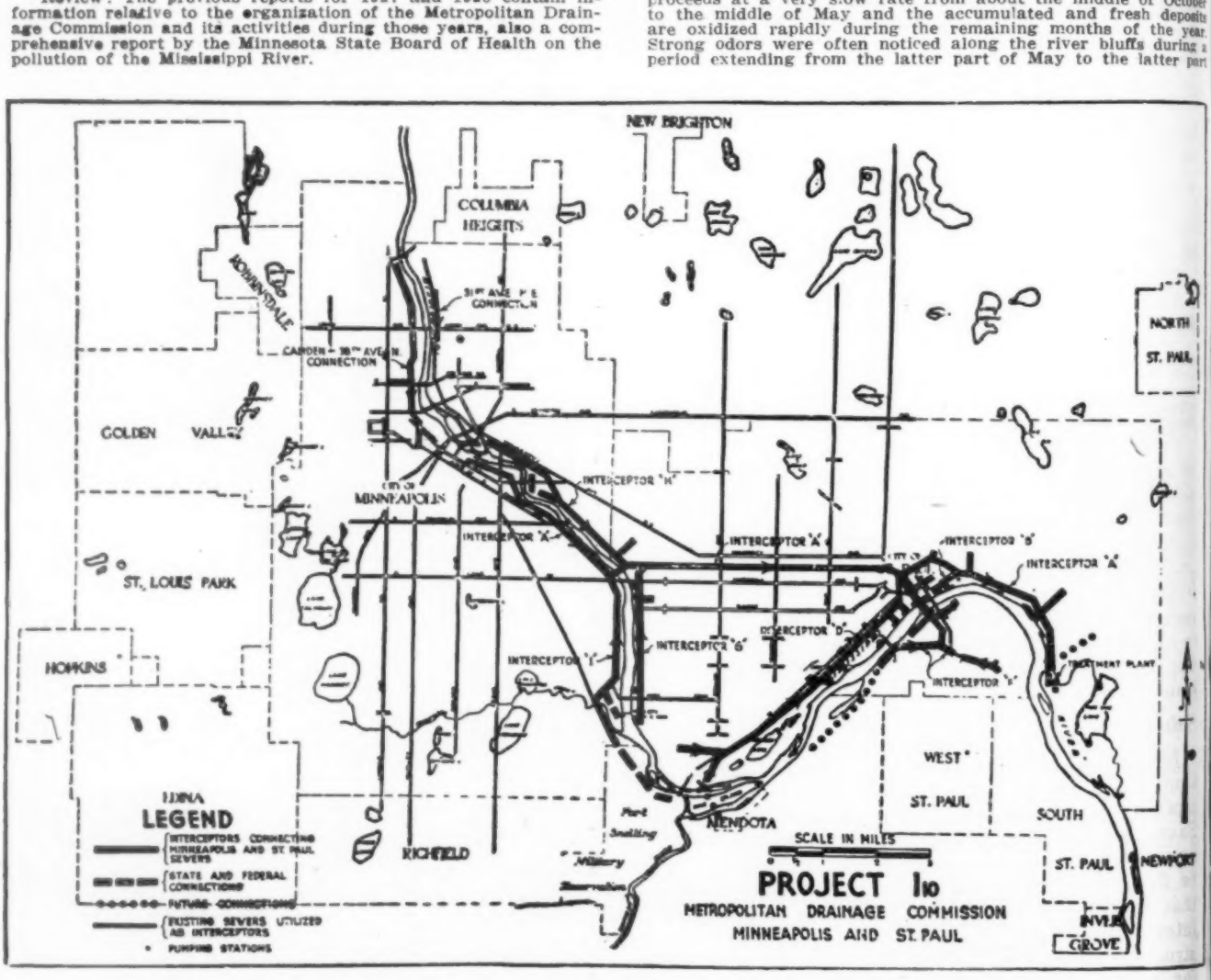
" 'This area contains nearly 135,000 acres, exclusive of the Fort Snelling Reservation. The estimated population within this area in 1927 was about 775,000. There were in operation on January 1, 1928, about 1,125 miles of sewers of the combined type draining about 42,000 acres and serving a sewered population of approximately 685,000. A total of about 100,000,000 gallons of sewage and packing house waste per day is being discharged directly into the river from the sewerage systems of this area. This sewage is discharged directly into the river without treatment through 84 main and relief outlets.

" 'The combined effect of this domestic sewage and industrial waste is equivalent to the domestic sewage from a population of about 1,300,000 when computed upon the oxygen demand basis. Of this 1,300,000, South St. Paul and Newport with their packing plants contribute waste which has an average annual domestic sewage equivalent in strength to that contributed by a population of about 325,000.' "

And from the Minneapolis-St. Paul Sanitary District Second and Third Reports, 1934-1935:

"The Mississippi River established new low discharge records again in 1934, completing six successive years of continued low flows during the critical summer and winter months. New low records for average monthly discharges since 1892 at St. Paul (below confluence with Minnesota River) were established for March, May, June, July, August, September, November and December. As shown by Table 4, the discharge at St. Paul exceeded 3,000 cubic feet per second for only two months—April and May—and was under 2,000 cubic feet per second for the other ten months. A minimum daily discharge at St. Paul of 632 cubic feet per second was observed on August 26th, while the average for the month established a new low of 864 c.f.s.

". . . **Septic conditions** similar to those experienced in past years were noticeable throughout the warmer months of the year, as evidenced by the ebullition of gases from the extensive sludge deposits which cover most of the bottom area of this pool, 5.5 miles long. Buoyed up by the gas, numerous sludge masses were frequently brought to the surface. The critical river water temperature for marked gasification appears to be about 15 degrees Centigrade (60° F.). Gasification usually becomes noticeably active when this temperature is reached in May and continues until October when the temperature again falls below 15° C. Sludge oxidation computations made from the analytical data also show a sharp break at 15° C. when plotted against temperature. It thus appears that the oxidation of the sludge deposits proceeds at a very slow rate from about the middle of October to the middle of May and the accumulated and fresh deposits are oxidized rapidly during the remaining months of the year. Strong odors were often noticed along the river bluffs during a period extending from the latter part of May to the latter part



Map of the 52 miles of intercepting sewers constructed by th e Minneapolis-St. Paul Sanitary District.

of September and resulted in complaints being made to Health Department officials by property owners along the river. During the summer months large areas of the pool were frequently covered with floating sludge, scum and sleek. (See accompanying pictures.)

". . . Soundings made in 1928 indicated that about 3,020,000 cubic yards of sludge and silt had been deposited in this pool since its completion in 1914. Additional soundings made in 1933 indicated a further deposition of 1,300,000 cubic yards, bringing the total accumulation to 4,320,000 cubic yards. These figures represent an average annual accumulation of 228,000 cubic yards from 1914 to 1933, inclusive, and an average of 261,000 cubic yards per year for the years 1928 to 1933. Some sludge is believed to have been flushed out of the lower portion of this pool in August, 1929, when part of the lock at the dam washed out and the pool was lowered about 12 feet.

". . . It has been estimated that for the record low discharge at St. Paul of 864 C.F.S., the average for August, 1934, there were only about five gallons of river water for every gallon of Twin City sewage, and for a few days this ratio dropped to less than 4 to 1.

". . . The record low river discharges in 1934 again resulted in more grossly polluted conditions than have ever been recorded before. During the months of July, August and September, the analytical data indicated the river at the Twin City Lock and Dam to be more heavily contaminated than for a similar period during any of the previous eight years of record. The average bacterial count for this three-months period of 1,400,000 per cubic centimeter, while the organisms of the coli-aerogenes group (those indicative of fecal contamination) averaged 12,000 per cubic centimeter are nearly twice the number in 1933, which, in turn, was higher than during any other similar period of the past seven years."

Early in April, 1933, the late James A. Childs, Chief Engineer, and his principal assistant, George J. Schroepfer, Metropolitan Drainage Commission, were informed of the proposed P.W.A. plan regarding which no announcement had then been made in Washington. During the depression it was difficult to persuade public officials or taxpayers to think of, much less undertake, the design and construction of a sewerage system. To qualify for P.W.A. loans and grants—the enabling legislation—the act previously mentioned creating the Minneapolis-St. Paul Sanitary District was passed by the house on April 17, by the senate on April 18, and signed by the governor of Minnesota on April 19, 1933.

Mr. Childs was responsible, more than anyone else, for arousing public officials and the citizens of the Twin Cities of the need to clean up the Mississippi River in its course through and below the Twin Cities. He was Engineer of Sanitation, Minnesota State Board of Health, and was made Chief Engineer of the Metropolitan Drainage Commission on August 1, 1927.

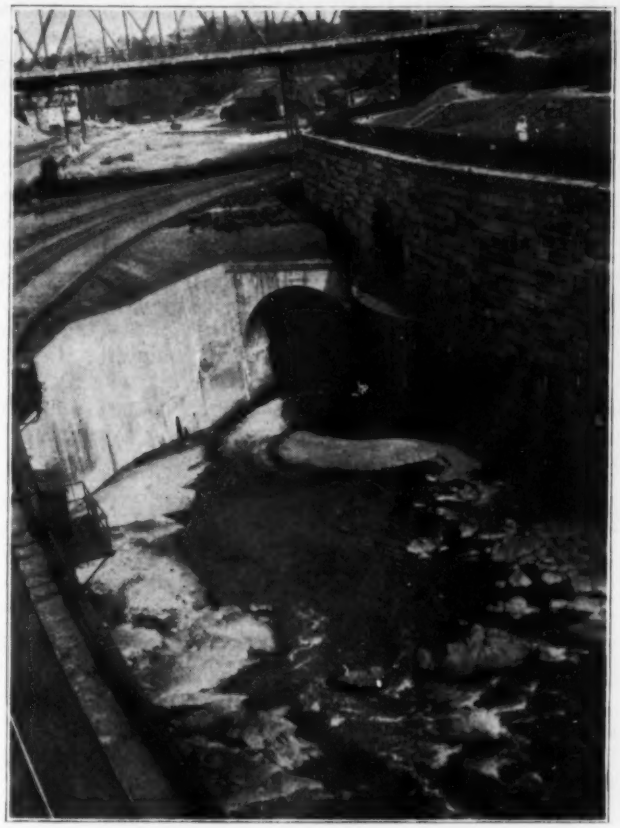
When the treatment works were dedicated by the Board of Trustees, May 16, 1938, the following appeared in the dedicatory message:

"On this occasion, also, we expressed our regrets that some of those who were interested in this project so deeply are no longer with us and cannot see the fulfillment of their dreams. Among those are the late James A. Childs, Chief Engineer of the Metropolitan Drainage Commission and Sanitary Engineer of the Sanitary District."

On May 26, 1944, the writer was conducted on a tour of inspection of the sewage treatment works by Mr. George J. Schroepfer, Chief Engineer and Superintendent, under whose direction, and that of C. C. Wilbur, Chief Engineer during the construction period, the project was designed and constructed. It was more like inspecting a water treatment plant than one for treating sewage. Everything was as clean as could be and in excellent order, with practically no odors. People of the Twin Cities have a right to be proud of this outstanding accomplishment.

Salient Features of the Project

Included in the project for the cleanup of the Mississippi River was the construction of 52 miles of intercepting sewers and the sewage treatment plant. The Sanitary District Act provides that all intercepting sewers used exclusively by each of the Twin Cities will be financed and constructed by the city using them; that all works used in common, which include the main intercepting sewer and the treatment plant, will be constructed by the Sanitary District. The main intercepting sewer leading to the treatment plant is approximately 9 miles in length, has a capacity at its lower



Jones' Falls Improvements, Baltimore
(Diversion of stream into entrance of 29 ft. tunnel.)

Fallsway Boulevard, Baltimore
(An express boulevard through the heart of the city where an open sewer and catch-all existed. The stream beneath flows through three conduits 20x15 ft.)

end of 610 million gallons daily, and is constructed through use of various types of materials. Most of the intercepting sewer is in tunnel and in its construction unusual difficulties were encountered and successfully overcome.

Private capital purchased all of the bonds issued for the project so that it became unnecessary to use any of the Federal Government's proffered 4% money, the average interest rate on all the bonds sold being somewhat less than 3%. Furthermore, it was unnecessary to spend the entire $18,000,000, the cost of the project being reduced to below $16,000,000 by economies effected in the design and construction of the treatment plant. The cost of the joint works, including the ten-mile interceptor and the treatment plant, was $10,770,000, of which $3,500,000 was spent on the treatment plant and the balance on the intercepting sewer. These joint works costs are divided as follows:

Minneapolis	$ 5,155,000.00
St. Paul	2,670,000.00
Federal Emergency Administration of Public Works	2,945,000.00
TOTAL	$10,770,000.00

Average sewage flow at present is somewhat over 120,000,000 gallons daily. An average of more than 200,000 pounds of sewage solids are removed from sewage daily, increasing at various times to 650,000 pounds.

The total project is being financed (including operation and maintenance, and interest and retirement of bonds) at a cost of less than one-third of a cent per person per day.

Intercepting sewer construction began July, 1934, and treatment plant construction, September, 1935. System placed in operation June 1, 1938.

Approximately 6,000,000 man-hours of employment were furnished, with the earnings of labor directly employed on the project being $5,600,000. In addition, many hours of employment were indirectly provided in manufacture and transportation of materials and equipment.

The Baltimore Sewerage System

The Baltimore fire of 1904 destroyed 140 acres of property worth $125,000,000. The city had grown from its incorporation in 1797 with a population of 20,000 to about 555,000 in 1906 *without a sewerage system.* True, there were private sewers for houses that happened to be located on or near Jones' Falls, an open stream that bisects the city. The stream received the effluent of private sewers from about 15,000 houses and flowed on its malodorous way. More than 90,000 houses, mostly of the row-type, built in solid city blocks, were provided with cesspools. Most of the alleys were 10 ft. in width, lined with two rows of cesspools, and contractors with fleets of tank wagons did a flourishing business pumping out these cesspools and carting their noisome cargo through the streets of Baltimore.

Baltimore in 1906 covered an area of 31.5 square miles and lies on the Patapsco River 14 miles above its confluence with Chesapeake Bay and around the basin extending some distance into the heart of the city. The business section lies on a plateau facing the waterfront and is surrounded by a tier of hills rising to a height of about 450 ft. Existing storm sewers were scattered and poorly located.

It would be hard to find a more convincing example of the benefits of a modern sewerage system than is represented by the Baltimore case. In 1904 and prior thereto Baltimore was shunned by many business enterprises because of its backwardness. The cause for the shift in public sentiment which led to its modernization is somewhat obscure. By some it is attributed to the fire. Others consider it the natural progress of events. From 1797 to 1906 the average annual increase in population was about 5,000. Baltimore's growth in the period 1900-1910, which marked the beginning of the improvement program, was less than 50,000, while in the period 1910-1920, during which most of the sanitary improvements were completed, the population, including that of annexed territory, increased by over 175,000. In percentage, the increase was over 30, as compared to 12.5 per cent for St. Louis, 11.5 per cent for Boston, 10.2 per cent for Pittsburgh, and less than 20 per cent for New York, Chicago and Philadelphia.

A fortunate selection of officials gave the city an administration which realized Baltimore's backwardness and determined to overcome the public inertia which had piled up for more than 100 years. With the fire of 1904 and the resulting post-fire modernization to give it impetus, the first ten-million-dollar sewerage loan passed the legislature the same year, along with the Sewerage Enabling Act which authorized the mayor and the city council to provide the city with modern and adequate sewerage facilities.

That the Sewerage Commission faced not only a very difficult engineering problem, but one netted with pitfalls through wavering public support, is evidenced by the delays in passage of the first sewerage loans. Approved by the State Legislature and the City Council, the loans met opposition from some of the "old guard" when submitted to a vote of the people.

However, through persistent effort on the part of progressive groups and partly as a result of the fire which rallied the citizenry to support the idea that recovery should be accomplished without external financial assistance, the loans were finally passed and in 1906 the Sewerage Commission began its important work.

Acting with a board of consulting engineers, the Baltimore Sewerage Commission evolved a plan providing two systems of sewers, one for storm water and the other for domestic and industrial sewage. Work was divided into the storm sewer division, the low level sanitary division, the high level sanitary division and the disposal division covering the Back River Sewage Treatment Plant, a testing station at Walbrook, and the construction of sanitary sewers in Walbrook.

Almost until the completion of its work, the Commission was consistently opposed by factions in the city whose ideas had not caught up with the age and who believed that the expenditure of money for municipal improvements, even for the sewerage system, was beyond reason. Since, with good reason from an engineering standpoint, construction on the treatment plant and disposal facilities was begun about two years before the laying of small intercepters and laterals, citizens could not immediately observe the results of the Commission's work. In 1909 when work on the smaller laterals was begun, the Commission had already completed the outfall sewer and considerable construction on the treatment plant, sewage pumping station, intercepters and other large work which brought the total expenditure to nearly $6,000,000.

In 1912 the chief engineer commented in his report: "Few people realize the magnitude of the work, the difficulties encountered, and the vast amount of details necessary to design and build two systems, one sanitary and one storm water, covering such a large area, over hills and valleys, through narrow alleys filled with leaking sewers and surface drainage and lined by very old houses, whose foundations, in many cases, are only 18 inches below the surface of the ground; and at the same time maintain these underground structures in

operation, and keep the thoroughfares open, allowing pedestrian, vehicular and street-car traffic to be maintained."

Along with the construction of the sewerage system went another project, undoubtedly more interesting in the eyes of the public, since it was encouraged by a number of improvement associations and prominent citizens. The project was the enclosing of Jones' Falls, one-time open sewer, in three enormous concrete tubes, and the construction over them of a wide, smooth boulevard—pictured herewith—through the heart of the city.

This stream, which drains an area of about 57 square miles, runs through the city, dividing it into two nearly equal parts. The slopes of its basin, which includes the Green Spring Valley, Mount Washington, etc., are very steep, and the run-off from this area at times reaches 10,000 cubic feet per second. The hydraulic grade of the stream through the city is also steep, the fall being 150 feet in four miles. The water is much polluted at times of ordinary flow and the stream bed, which averages about 70 feet in width, constituted a receptacle for filth of all kinds. An occasional high stage of the stream caused sewers entering it to flood the low lying districts on its western shore.

Many damage suits had resulted from overflows in the old drain lines to Jones' Falls, amounting in 1907, for instance, to $112,000.

Definite evidence of the collapse of opposition and the birth of hearty support came in 1911 when the voters authorized the second ten-million-dollar sewerage loan by a large majority. By that time work on the smaller lateral sewers was well under way, providing definite evidence of accomplishment. Apparently it was not difficult for the people to observe that work was going on when the streets fronting their homes were being converted into spadesful of earth.

At this stage of the construction the sewerage work was sufficiently advanced to permit the paving commission to begin operations, and it followed in the path of the Sewerage Commission, laying broad, smooth streets where cobblestone paving had previously existed for the most part.

The years 1913 and 1914 witnessed the further expenditure of over seven million dollars, which brought the total cost to $23,000,000. By January 1, 1915, the Sewerage Commission had built the sewage treatment plant, the pumping station, and the Jones' Falls improvement, had constructed a total of 597.4 miles of sewers and drains, 10,567 manholes, and 4,801 inlets and catchbasins in the storm and sanitary sewerage systems; 55,000 houses were connected with the sanitary system and 25,000 more were ready for connection.

Throughout the entire work extensive use was made of photography to protect the Commission from unfair damage suits because of the cracking or settling of buildings. Pictures were taken of streets, buildings and sidewalks about which any complaint might arise, and the pictures were carefully studied for cracks existing before the start of excavations for the sewers. Many of the older buildings of the city were constructed with scanty foundations, and settlement and cracks were numerous before the work was completed.

Looks Good To Drink!

From this recently completed artesian well in Sturgeon Bay, Wisc., and others supplying this city, all records have been broken of artesian flow from the Niagara limestone.

This well is 313 feet deep and cased with genuine wrought-iron casing down 78 feet. The interior drill pipe goes down 104 feet, and the annular space between required 11,000 pounds of sand and 105 sacks of cement to fill.

Fifth Annual Water Conference—Engineers' Society of Western Pennsylvania

The fifth annual Water Conference of the Engineers' Society of Western Pennsylvania will be held at the William Penn Hotel, Pittsburgh Pa., on Oct. 30-31, under the general chairmanship of H. M. Olson, of the Ohio Salt Co.

In addition to discussing boiler water treatment and other industrial water problems, the program has scheduled several topics of interest to water works men. Of particular interest are "The Removal of Ammonia by Chlorination" by A. E. Griffin, Asst. Dir., Technical Services Div., Wallace and Tiernan Co., Newark, N. J., and "Cathodic Protection of Steel Equipment Submerged in Water," by L. P. Sudrabin, Consulting Engr., Dayton, O.

Other scheduled papers of interest include "Recent Experiences in Demineralizing Water" by E. M. Gilwood and V. J. Calise, Research Chemical Engrs., Permutit Co., New York, N. Y.; "Lime and Limestone in Waste Pickle Liquor Treatment," by R. D. Hoak, and C. J. Lewis, Indusustrial Fellows, Mellon Institute, Pittsburgh, and W. W. Hodge, Dean of Engineering, University of West Virginia, Morgantown, W. Va.; "The Use of Silicates for Coagulation," by H. R. Hay, Chemical Engineer, Philadelphia Quartz Co., Philadelphia, Pa.; and "Water Treatment at Koppers United Company Plant, Cobuta, Pa."

This latter topic is divided into three parts, the first on Filtration, Softening and Boiler Feedwater Treatment by Paul J. Stein, Gen. Foreman of Water Supply; the second on Service Water Facilities by H. W. Howe, Chief Engineer; and the third, on Effluent Treating Facilities, by F. B. Varga, Asst. Supt. of Processes.

As is usual at these meetings, each paper will be discussed by several persons each of whom presents a five-minute prepared discussion.

FINANCING POST-WAR PUBLIC WORKS

The Question of Justification for Some Federal Aid

By WILLIAM RAISCH
Consulting Engineer*
NEW YORK, N. Y.

POSTWAR Public Works financing has been the subject of much discussion but unfortunately—even at this late date—we are still far from a solution. True, the engineering costs have been taken care of in a few states but that represents only a fraction of the total cost. There are some who say that the obligation should be that of the Federal Government while others, the States rights advocates and the "rugged individualists," (more or less), contend that this would simply be another step toward bureaucratic control. They feel that the work should be carried on in the usual way, perhaps aided by some sort of a State subsidy. Since this difference of opinion exists it would seem advisable to consider a few pertinent facts at this stage of Postwar Works Planning, which seems to be lagging considerably. The question is—why?

How Shall the Work Be Financed?

The one thing on which all are agreed is that the object of all postwar planning is to help us through the difficult transition period which will follow the war, when war industries cease to function and men in the armed services are demobilized, and will need jobs with the least period of waiting.

With that as the objective, the question of how the work should be financed might best be answered by first determining who will receive the greatest benefit through local employment on Public Works projects? If the bulk of the purchasing power created by employment on any given project remains largely within a certain locality then that locality might very well carry its own burden. However, if the employment created by a project is felt in various localities throughout the nation, then it seems only right and proper to call upon the Federal Government for some assistance.

Benefits Go Back to the Source of Materials

In the case of a sewage treatment or water works plant, the construction labor employed on a project represents only twenty or thirty per cent of the total cost, the balance going toward the purchase of materials, overhead and profit. Consequently, the maximum initial purchasing power created by direct employment on this type of work ranges between twenty and thirty cents for every dollar expended by the municipality. The remainder, about fifty cents out of every dollar, will be spent for materials and equipment which are manufactured in distant areas. Obviously, it is impossible to predict just how or where the greatest benefits will fall but it is fairly certain that only a relatively small portion of labor's purchasing power will accrue to the sponsoring municipality. There are, of course, other types of work such as the installation of vitrified pipe sewers, which involve very little outlay for materials and a much greater amount of direct labor, but these instances are more than offset by the great variety of other structures in which manufactured products predominate.

Since payroll benefits are spread throughout the nation, It would appear reasonable to expect that the Federal Government should render some degree of financing assistance. For example, the labor required to install a centrifugal pump is probably less than ten percent of its value, yet the indirect labor employed in manufacturing that same pump at some distant point amounts to seventy-five to eighty percent. The same applies to many other items. Cast-iron pipe is produced in specific sections of the country, while valves and fittings come from others. Steel is rolled in certain areas but is fabricated in any one of a thousand shops throughout the nation. Brass products can be traced through numerous operations in many states and the same can be said for instruments, meters, electrical devices and scores of other items. Seldom do we find more than but a few things which originate in the same place. Thus, it will be seen that employment benefits extend much further than just the location of the project itself.

Pressure Construction Instead of Normal

Another factor worthy of consideration is that if Postwar Public Work construction is to be effective, it must be ready for commencing immediately after hostilities cease. Furthermore, the program must be advanced to produce local improvements within a period of from three to five years at most; whereas, under ordinary circumstances, this same work would normally be spread over a ten or fifteen year period. The method is more costly and places an unusually heavy burden on the local taxable property which may later prove disastrous. If this occurs, one of the principal objects of postwar construction is defeated, since private enterprise would be retarded rather than stimulated.

Public Works in itself cannot absorb all of the manpower that will be available after the war. It can only serve as a stop-gap to tide the nation over a period until private industry is restored to normalcy. Therefore, since Public Works must be confined within a limited period to be effective, and since the burden in doing so would drive many municipalities beyond their debt limit, and since the benefits are to extend out to the production localities, there seems to be a fair degree of argument for at least some form of financial aid from the Federal Government.

The government might very well be called upon to subidsize the difference between abnormal and normal costs, much in the same manner as it did under P.W.A. some years ago. These views will undoubtedly provoke discussion but, regardless of the outcome, they will at lease serve to get something started. Time is short and the sooner we can find the answer to equitable distribution of costs, the easier our future course will be as Post-war Public Works planners.

[Note: Mr. Raisch was asked to give his views for publication in *Waterworks and Sewerage*. The same invitation is extended to those who may have different views to offer or even those who may wish to amplify the arguments of Mr. Raisch.—EDITOR.]

*Presently Consulting Engr. to the Boro-President of Queens, N. Y.

A "LACE CURTAIN" PUMPING STATION

BY EARL R. PERRY
Chief Engineer, Bureau of Engineering
WORCESTER, MASS.

IN THE city of Worcester the wide range of elevation throughout the city has made it necessary to supply water by means of three pressure systems. This dictated that one of the high service booster stations must be located near residences. Difficulty in securing a site for the superhigh pressure station because of objections by owners of adjoining property was solved by designing a pumping station that would not only harmonize with the surrounding homes but would actually look like a house. Thus was the so-called "lace curtain" Tory Fort Lane Pumping Station designed and built.

The acceptance of this pumping station by the residents, none of whom have raised any objections, and many of whom have made complimentary remarks, makes it obvious that the idea was successful. This same acceptance over a period of a few years points the way for post-war planners and those who are "blueprinting now." Pleasing design of water works and sewage plant structures, whether or not they are near residences, should receive full consideration by engineers before the design goes on the drafting board.

Style of Design

For the Worcester pumping station the English cottage style architecture was selected. Weathered brick, laid in English bond with stone quoins irregularly placed around the openings were used. The chimney is the dominant feature, and the gables are decorated with brick in pattern between redwood timbers and with ornamental verge boards. All timber faces were adzed and stained, thereby achieving a harmonious effect, which does not emphasize the utilitarian character of the "home of the pumps."

The appearance of a residence is carried out even to the extent of providing draperies of monk's cloth (hence the nickname "lace curtain"), and all signs which are usually in buildings of this type have been omitted with the exception of a small bronze plate located just above the front door bell pushbutton. The building was designed by Mr. Frank Cutting, architect of Worcester.

Another innovation in the construction of this building was the use in the building of bricks reclaimed from brick sidewalks that had been removed from a number of streets throughout the city. These reclaimed bricks proved to be well adapted for the type of architecture selected.

Equipment Housed in Station

The Tory Fort Lane station contains one 300 g.p.m. three-stage Dayton-Dowd centrifugal pump driven by a 40-hp. "G. E." motor which pumps all the water normally required. Installed as auxiliary pumps and for future expected increased demand, there are two 1,000 g.p.m. two-stage Dayton-Dowd centrifugal pumps driven by 150-hp. "G. E." motors. The pumps transfer water from the low pressure system to the superhigh pressure system, so-called, and operate under a total dynamic head of 395 ft.

The water is pumped to underground storage basins having a capacity of approximately 250,000

Worcester's Tory Fort Lane Pumping Station
(Better Known as the "Lace Curtain Pumping Station")

gallons and located on Howland Hill, which is at an elevation of 1,052 feet above mean sea level, this being the highest point in this portion of the City of Worcester.

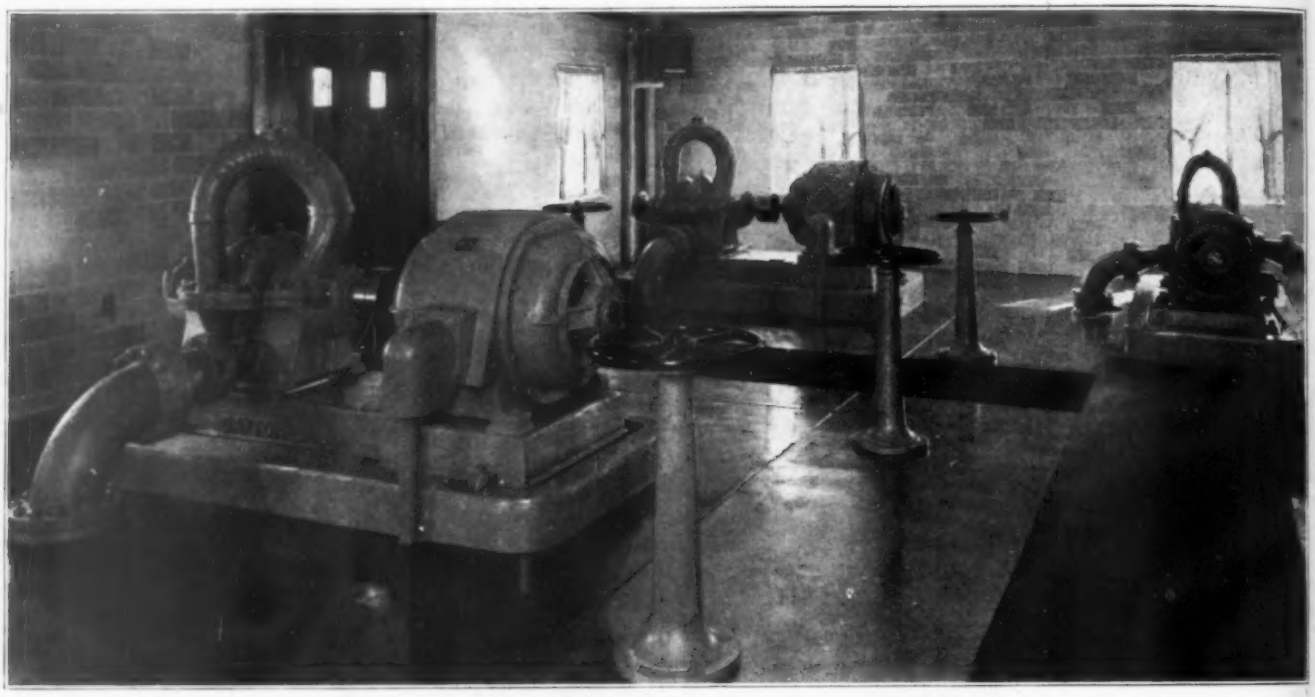
The superhigh pressure system serves several areas of high elevation located along the westerly and northerly boundaries of the city.

A "Chronoflo" transmitter installed at Howland Hill Reservoir transmits signals every fifteen seconds over a single wire to a receiver at the pumping station, which actuates a depth recording gauge and also automatically starts and stops the small pump at predetermined levels of water in the reservoir. In the event of a serious main break in the system, or if for some reason the pump fails to cease operation at the normal high water level in the reservoir, an alarm is sent over the fire alarm telegraph system to the Fire Alarm Telegraph Station on Park Avenue. The operators at this station are under orders to notify the officials of the Bureau of Water.

Detail of Front Door of the "Home of the Pumps"

Post-War Improvement Projects

In all of our post-war construction planning, we in Worcester are giving much thought to the appearance of the various types of structures under design. It is our opinion that in the past far too little thought has been given to the matter of appearance of public utility and engineering structures, and we expect to do something about it in Worcester. Our "Lace Curtain" pumping station is the initial step in this program of developing more attractive utility and service structures as post-war projects.



Equipment in Worcester's Superhigh Pressure System
(1—300 *gpm*, 2—1000 *gpm pumps, motors, appurtenances*)

Have Any Sewers That Sew in Your Town?

"Sewers Wanted in Milwaukee"—but not the kind that you are thinking of.

Imagine the consternation of those attending the AWWA meeting in Milwaukee when the sign pictured herewith greeted them at the Schroeder Hotel entrance. Stranger yet was the presence of two of these refined "Sewer Wanted" cards in the show windows of one of Milwaukee's most exclusive women's shops located in the hotel.

It was apparent that few of the outlanders had ever heard of "Sewing Sewers" nor of "Sueing Sewers" —but of "Sowing Sowers," well that puts a light on the whole matter. So in Milwaukee they needed some "Sewers that Sew," on ladies dresses, etc., and they aren't particular about gender because "Seamstresses Wanted" would have limited the field and besides it's too hard to pronounce seamstresses. After all they had some sewing to be sewed, and so we would say that they needed some sewers (no sewers) to do it.

CHARTS FOR DETERMINING EQUIVALENT PIPES AND LOOP FLOW DISTRIBUTION

By H. W. CLARK
City Manager*
NIAGARA FALLS, N. Y.

The Author

IN the determination of flows in pipe network systems by the Hardy Cross method, it is often desirable, for simplification of the work, to reduce parts of the system to an equivalent size pipe, and use the equivalent value in the computations.

For a quick and easy method of computing equivalent pipes and determining the percentage of flows in pipe loops, the accompanying charts have been prepared.

Method of Preparing Charts

The Williams and Hazen Formula[1] was used, with the following quantity notations:

The basic formula is $V = CR^{.63} S^{.54}\ 0.001^{-0.04}$
Flow $Q = VA = CR^{.63} S^{.54}\ 1.318A$
where Q = Flow in cubic feet per second (c.f.s.)
C = Williams & Hazen pipe coefficient of roughness
R = Hydraulic radius of pipe in feet
S = Slope of pipe = h divided by l
A = Area of pipe in square feet = $.7854D^2$
D = Diameter of pipe in feet
h = Head loss in pipe considered
L = Length of pipe considered in feet.

Substituting in the above formula, we obtain

$$Q = C\ 1.318\ (.25)^{.63}\ .7854\ D^{2.63} \left(\frac{h}{L}\right)^{.54}$$

as the constants are common to all pipes and in equivalent pipes or loops the head loss h is the same for each, Q is proportional to $\frac{D^{2.63}}{L^{0.54}}$ for pipes of equal roughness.

This is the same method given by James A. Conklin in an article in Engineering News-Record[2] in which he designated the quantity $\frac{D^{2.63}}{L^{0.54}}$ as the Pipe Factor, although he used the Chezy formula with the factor equal to $\frac{D^{2.5}}{L^{0.5}}$.

In order to construct the charts the $D^{2.63}$ values for nominal diameters of cast iron pipe were computed and spotted on the Y axis of logarithmic paper, then through each of these points were drawn the parallel lines $1/L^{0.54}$ using 1000 foot units for L. At the left of the diagram is read the Factor for any corresponding pipe diameter and length.

For convenience in use two charts on 8½x11 inch logarithmic paper have been prepared rather than preparing a large unwieldy chart. Obviously the charts overlap and the choice of chart in the overlapping sections depends on the length of pipe involved in the computation.

Demonstration of Chart Use

In demonstrating the use of the diagrams, some published examples will be used, as most readers will probably be familiar with the examples.

Example A

In D. R. Taylor's excellent article on the Hardy Cross method, in Water Works and Sewerage[3], he uses the following circuit:

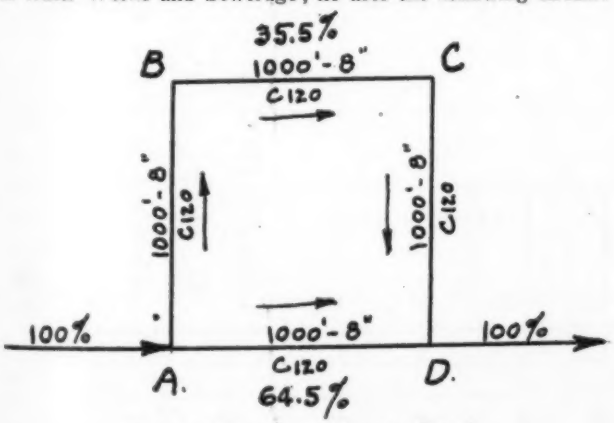


Fig. 1—Example A—Simple Circuit

The direction of flow is indicated by the arrows. From Chart I, Factor (F) is determined as follows: Look for the 1000 foot line at bottom of diagram, follow this line vertically to diagonal marked 8 in., from this intersection point follow horizontally to the left scale and read .345. In the same manner follow the 3000 foot line vertically to the 8 in., diagonal, thence left from that point and read .19.

Add these two quantities and divide the sum into each, obtaining the percentages shown. These percentages check those of the original problem, after its two calculations.

The sum of these factors, 0.535 intersects the 8 in. diagonal line at 445 feet.

Factor F = 0.535 = 445 ft. in 8 in. pipe, the equivalent pipe.

AD = 1000 ft. of 8 in., F =	.345	64.5%
ABCD = 3000 ft. of 8 in., F =	.19	35.5%
	.535	100%

Inasmuch as the Q's are expressed in percentages where the head losses are desired, Q may be used as g.p.m., c.f.s. or m.g.d.

We can now check the above problem using Hardy Cross factors from Taylor's article[3], Fig. 2.

The k for 1000 ft. of 8 in. with (C 120) = 6.0; for 3000 ft. of 8 in. with (C 120) = 18.0.

The formula for head loss by Doland's formula[4] is

$$h = \frac{k}{100{,}000}\ (\text{gpm.})^{1.85}$$

This formula can be simplified by taking $100^{1.85}$ out of the parenthesis and dividing by 100,000, it then can be written

$$h = k\ (.05012)\ (.01\ \text{gpm.})^{1.85}$$

Calling the total Q, 1000 gpm. the flow in AD will be 645 gpm., in ABCD 355 gpm. and in the equivalent pipe 1000 gpm.; then the head loss in the paths of the loop and in the equivalent pipe is found as follows:

Path AD	h = 6 (.05012)	$(6.45)^{1.85}$	= 9.45
Path ABCD	h = 18 (.05012)	$(3.55)^{1.85}$	= 9.43
Equiv. pipe 445 ft. of 8 in.,	k = 6 (.445)		= 2.67
	h = 2.67 (.05012)	$(10.)^{1.85}$	= 9.44

This agreement of the head loss "h" appears close enough for any practical purpose.

Example B

Three parallel pipes are just as simple to figure as shown below, using the same steps as in Example A.

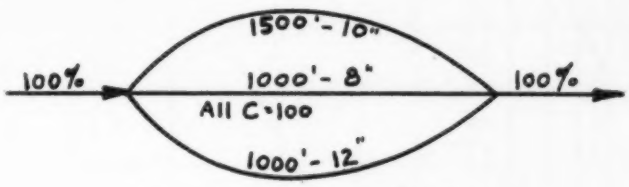


Fig. 2—Example B—Parallel Pipes

1500 ft. of 10 in.	F =	.50	= 27.1%
1000 ft. of 8 in.	F =	.345	= 18.7%
1000 ft. of 12 in.	F =	1.000	= 54.2%
		1.845	100%

F 1.845 = 135 ft. of 10 in.; 325 ft. of 12 in.; or 1300 ft. of 16 in.

These values may be checked by the same method given for finding h in Example A.

Example C

The chart values check closely the values given in tables computed by W. E. Howland and F. Farr, Jr.[5] shown by the following example.

Take 500 ft. of 8 in. pipe F = .5 from Chart I.

Reading across the .5 line where it intersects the 10 in., 12 in., and 16 in. pipe lines we find the equivalent lengths to be

10 in. = 1,480 ft.
12 in. = 3,600 ft.
16 in. = 14,600 ft.

[*Until recently City Engineer of Niagara Falls, which position the author held at the time of preparing this article.—Ed.]

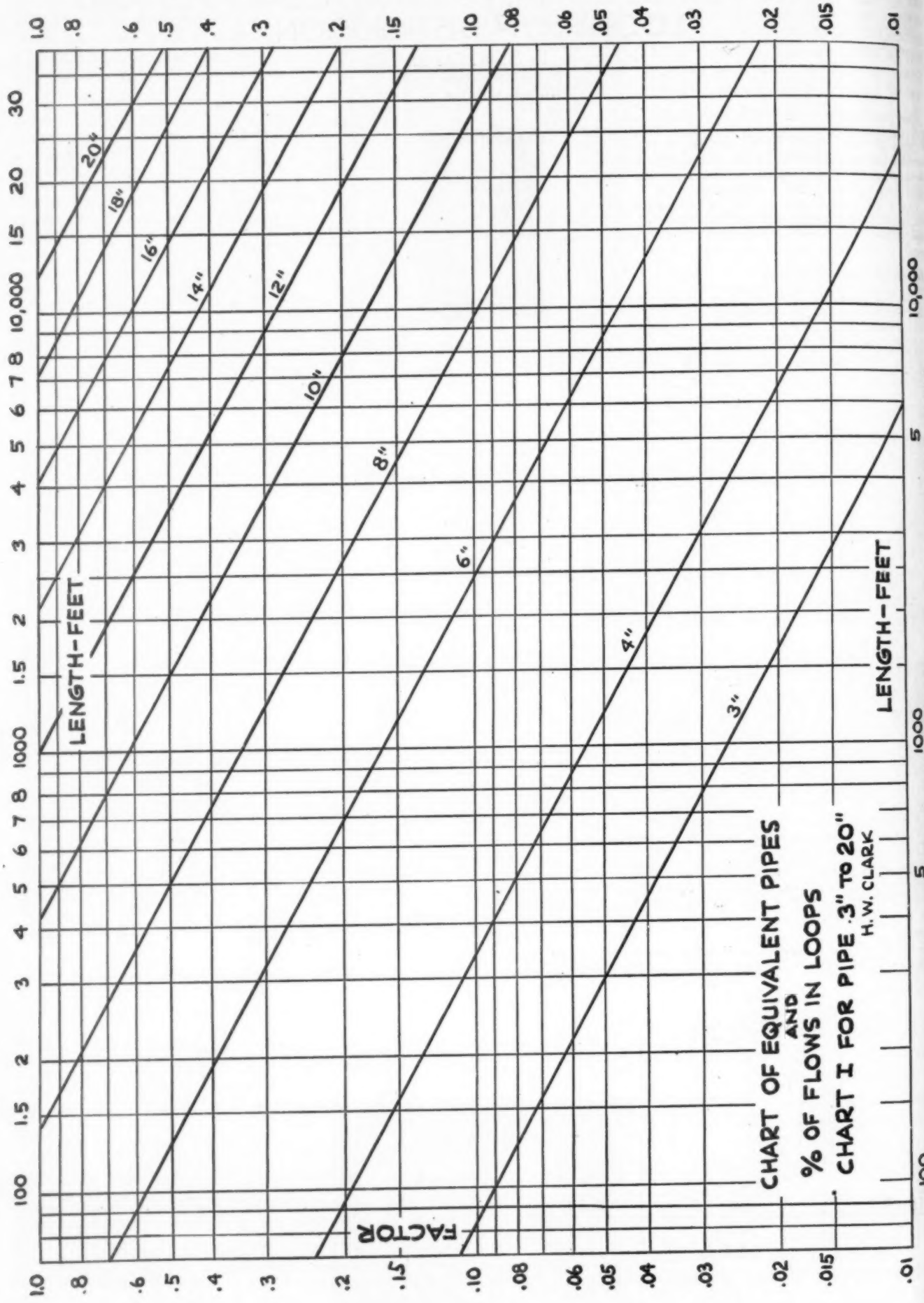


Chart I—Equivalent Pipes and Per Cent Flows in Loops for Pipes 3-in. to 20-in.

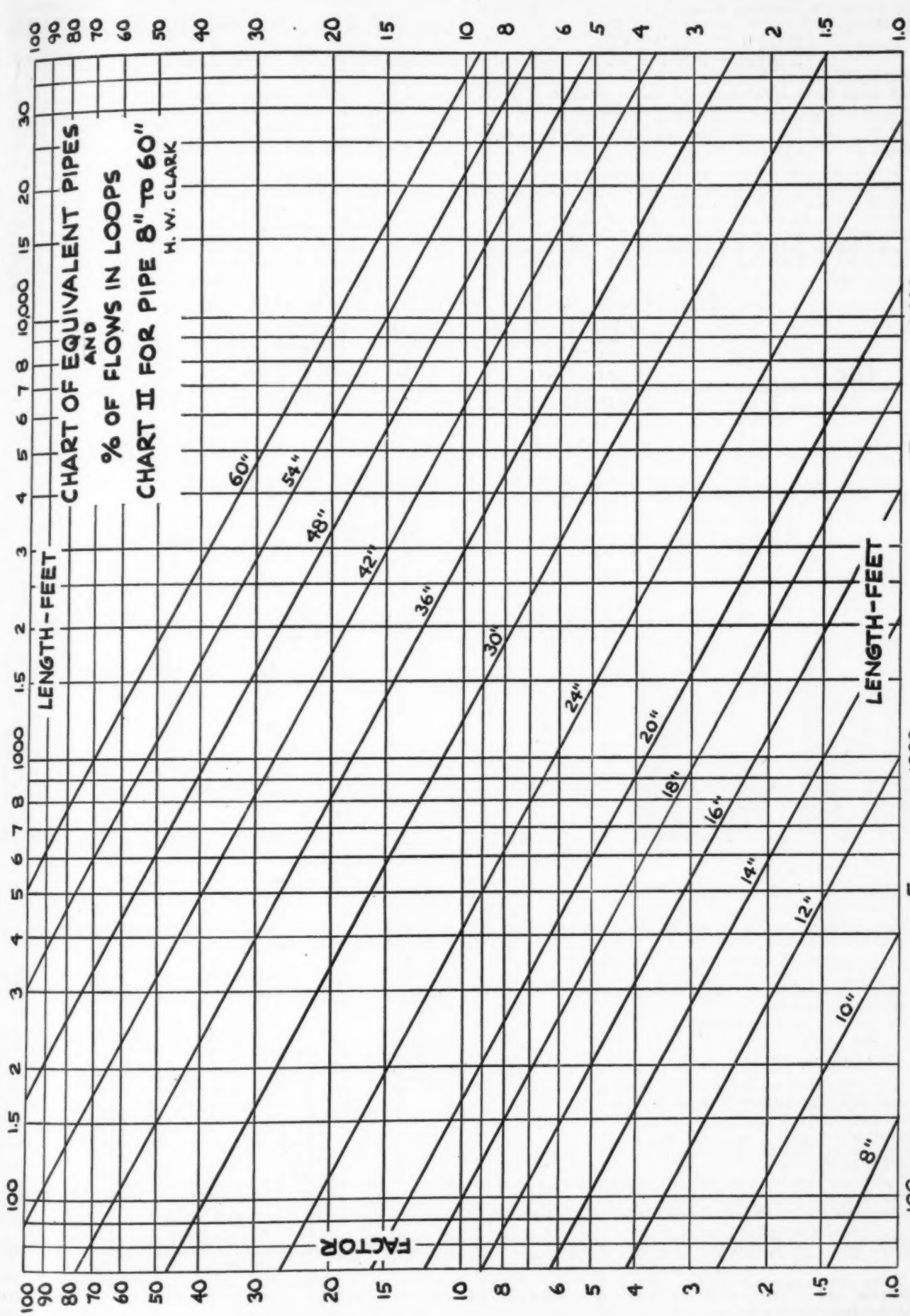


Chart II—Equivalent Pipes and Per Cent Flows in Loops for Pipes 8-in. to 60-in.

Chart I—Equivalent Pipes and Per Cent Flows in Loops for Pipes 3-in. to 20-in.

From the Howland & Farr Table, Page 238[5] mentioned above we find the equivalent values of 1 ft. of 8 in. pipe in the other sizes to be

1 ft. of 8 in. = 2.965 ft. of 10 in.
1 ft. of 8 in. = 7.205 ft. of 12 in.
1 ft. of 8 in. = 29.25 ft. of 16 in.

Multiplying each of these values by 500 we obtain, respectively, 1482.5 ft. of 10 in. 3602.5 ft. of 12 in. and 14625 ft. of 16 in. which considering the size of the chart readings is a pretty fair check.

Example D

Pipe circuits with crossover pipes and intermediate take outs are not subject to exact analysis, but many of them can be closely approximated and many steps saved, as the following problem will show. It is not claimed, however, that all circuits will work out as well, for with complicated systems good judgment and experience in the method of computation will be the best guide.

Let us take D. R. Taylor's two circuit problem from the same article[3] previously mentioned.

We will use the C = 120 values, then

AD 1000 ft. (C = 100) = 1400 ft. (C = 120); F = .288 60.2%
ABCD 3000 ft. (C = 120) = 3000 ft. (C = 120); F = .190 39.8%
.478 100.0%

Equiv. Pipe F (.478) = 550 ft. 8 in. (C = 120)

Check computations.

AD k for 1400 ft. of 8 in. (C = 120) = 6 (1.4) = 8.4
ABCD k for 3000 ft. of 8 in. (C = 120) = 6 (3.0) = 18.0
Equiv. pipe k for 550 ft. of 8 in. (C = 120) = 6 (.55) = 3.3

Assuming 1000 gpm total flow.

AD h = 8.4 (.05012) $6.02^{1.85}$ = 11.61
ABCD h = 18. (.05012) $3.98^{1.85}$ = 11.60
Equiv. Pipe h = 3.3 (.05012) $10^{1.85}$ = 11.63

It will also be noted that the k value for 1400 ft. of 8 in. (C = 120) is 8.4 which is the same value for 1000 ft. of 8 in. (C = 100) 8.4 × (1.0) from Fig. 2[3] values of k.

For changing from C = 100 to any other value of C, multiply by the following factor; if changing from C = 120, etc., to C = 100, divide C = 120, etc., by the factor, these factors are simply $\left(\frac{Cx}{C100}\right)^{1.85}$

Where C =	90	100	110	120	130	140
f =	.823	1.0	1.193	1.40	1.625	1.863

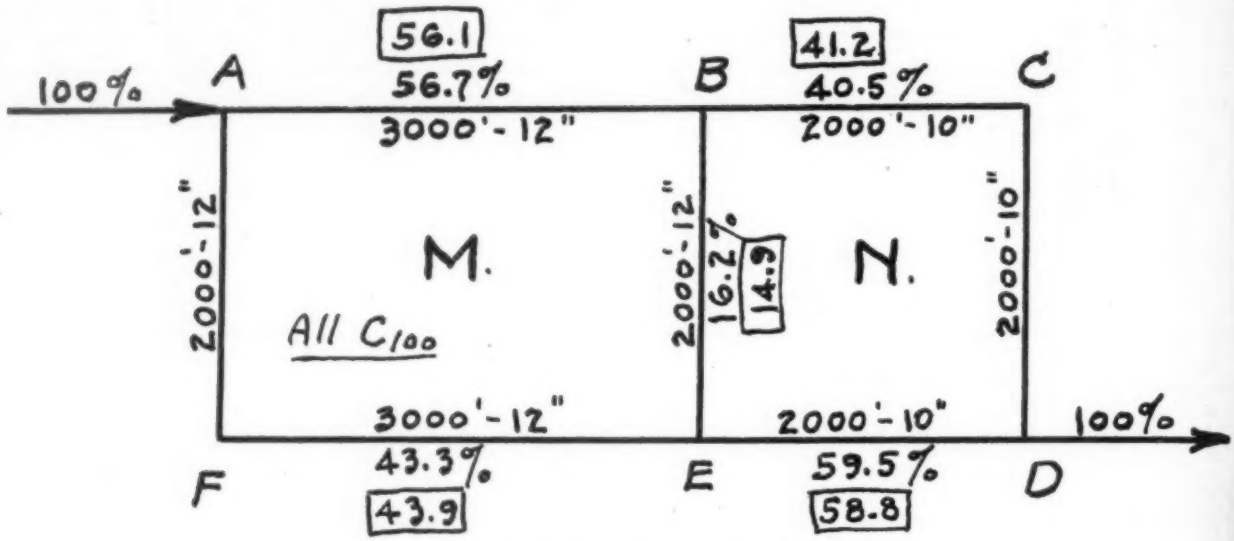


Fig. 3—Example C—Two Circuits

Using the same steps as outlined in Example A the following data are obtained:

AB = 3000 ft. of 12 in. F = .55 56.7%
AFE = 5000 ft. of 12 in. F = .42 43.3%
.97 100.0%

BCD = 4000 ft. of 10 in. F = .29 40.5%
ED = 2000 ft. of 10 in. F = .425 59.5%
.715 100.0%

The crossover pipe is not considered in the first approximation, only the outside circuit.

Place the percentage flows as computed on the diagram and we find BE to be 16.2 per cent.

Computing the circuits by the Hardy Cross method, a correction in M of —.6 per cent clockwise is found, and in N of + .7 per cent clockwise on the first computation. These are within .1 per cent of the final value.

The pipe BE has two corrections, both being minus, with the final value of 16.2 — .6 —.7 = 14.9.

Example E Where C Varies in the Loops

In the foregoing examples the C of all pipes has been considered equal but pipes of different C values can also be compared by converting both to the same C and proceeding as demonstrated.

Consider the first problem again, using C = 100 for AD and C = 120 for ABCD.

The change can be either way, the method to pursue as follows:

Change AD (C = 100) to C = 120 by multiplying the length 1000 ft. by $\left(\frac{120}{100}\right)^{1.85} = 1000 \times 1.4 = 1400$ ft.

If the change had been to C = 100 for the C = 120 pipe, ABCD = 3000 ft. (C = 120) would have been divided by 1.4 and the resulting length used with the 1000 ft. for AD and C = 100 for both.

Conclusions

The author has used the foregoing method in computing circuits and found it helped greatly in reducing the computations required, in some instances even giving initial results within a few per cent of the final.

One is cautioned, however, that complicated circuits and those with take offs must be examined carefully, as small increment

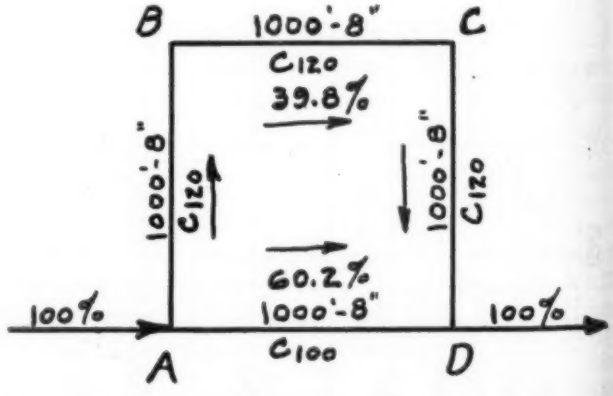


Fig. 4—Example D—Simple Circuit Where C Varies in the Loop

corrections will sometimes throw them out of balance instead of toward convergence.

Large pipes with low resistance factors in loops with smaller pipes of high resistance are very tricky in adjusting flows.

Acknowledgment is hereby made of the great assistance obtained from the articles quoted. In the use of published examples for comparison the author has taken them only for the purpose of presenting a new method in familiar settings.

The methods outlined above have been presented with the hope that engineers responsible for distribution system designs may be able to save time and effort in solving their problems.

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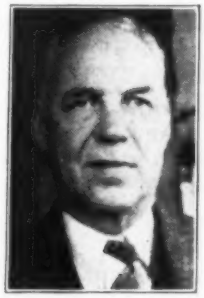
2. James A. Conklin—Flow in Pipe Networks by Direct Determination—Eng. News-Rec. 128-41 (1942).
3. D. R. Taylor—The Hardy Cross Method—Water Works & Sewerage (1943).
4. J. J. Doland—Simplified Analysis of Flow in Water Distribution Systems—Eng. News-Record 117-475 (1936).
5. W. E. Howland & F. Farr, Jr.—Computation of Equivalent Lengths of Parallel Pipe Systems—Jour. A.W.W.A. 33-237 (1941).
6. Hardy Cross—Analysis of Flow in Networks of Conduits or Conductors—Univ. of Illinois Bul. No. 268 (1936).

HISTORY OF THE MAINE WATER DISTRICT

Interestingly Told to M.W.U.A. by Daddy of the Important Maine Water District Acts

With apologies for the delay in printing this report of the proceedings of an interesting meeting, we are happy that the availability of this space makes it possible to print the account even at this late day.—Ed.

Many have knowledge already of the Water District Law of Maine but many more should find this a highly interesting and significant development in public water supply history.



Presidents

(M.W.U.A.)
David E. Moulton
Attorney
Portland Water Distr.

(N.E.W.W.A.)
Horace L. Clark
Supt.
Sanford Water Distr.

Many Maine municipalities found themselves at the mercy of water companies with more regard for "water" of the Wall St. variety than that of wholesomeness and sufficient pressure in their pipe systems in the 1890s. Because of the law limiting bonded indebtedness, there seemed little in the way of taking over and financing these public supply systems that could be done. The dilemma was a real one until a forward thinking lawyer (much feared in the Maine courts we have learned) stood on a hill overlooking his native city of Waterville, Me., and, while looking down on the sewage and bark extract laden waters pumped into Waterville's mains, conceived of a way out. The result was the drafting of the first Maine Water District Act. The water district in this act was in effect an entirely new political subdivision—in all effects a new municipality. This in turn made it possible for the water district to function as a municipality insofar as financing, building and operating a public water supply system was concerned. The Water District, after its creation by the Maine legislature, had the right to call bond elections and borrow money without regard for the existing tax limit on the already existing municipalities which were to benefit from the new or improved water supply facilities of the water district.

To the private water companies this all sounded so much like a scheme of "beating the Devil around the bush" that they felt that it couldn't stand—that the new law could be proved unconstitutional and promptly thrown out. They fought the Water District Act hard but history tells of their utter defeat at every new turn and argument in the courts. And history further tells of how very sound the Maine Water District Law has proven and how much it has benefited the man in the street where these districts have been established and managed and operated without political interference or the scooping of surplus earnings for use in municipal financing other than for water supply betterments. Even a cursory study of Water District financing in Maine and ultimate rate reductions will reveal what is meant.

Host

L. G. Smith
Supt.
Kennebunk Water Distr.

(He couldn't do anything about the weather.)

Harvey D. Eaton, Esq.

So it was something of a treat to meet and listen to the unfolding of the history of Maine Water District Law by its originator—Harvey D. Eaton, Esq., Attorney at Law, Waterville, Me.

Principal Speakers

Harvey D. Eaton
Attorney
Waterville, Me.
("Daddy" of Maine Water Distr. Law.)

Fred J. Reny
Gen'l Mgr.
Portland Water Distr.
(From private to public ownership.)

The day was a cold and rainy one but many came long distances to Kennybunk port, on the sea, to hear the venerable hard-hitting Harvey D. Eaton tell his story in that fashion which a keen lawyer knows how to use. There we thought back to the courts of the early 1900s, and pictured a pretty tough opposition that the water companies found themselves up against in trying to kill the new and revolutionary Water District Act.

Mr. Eaton told of the long years of unheeded complaint to the Maine Water Co. then serving the cities of

Waterville and Fairfield, Me. This is what brought on the Water District Act—and the Kennebec Water District serving the Waterville-Fairfield District was the first in Maine.

The constitutionality of the Water District Act was repeatedly tested in court, using the Kennebec Water District, but without the results sought by the old Maine Water Co. The final decision was handed down in 1902, and once and for all time established constitutionality of the Water District and the methods employed in condemnation and seizure of property, financing and management. And thus, said Mr. Eaton, the Water District came into the field of public utilities.

An interesting section in the Maine law is that which empowers the court to appoint their appraisers and to issue instructions to such appraisers *before* this group proceeds to fix the valuation of the property being taken by the district under principles of eminent domain.

Mr. Eaton related that one municipality served by a Water District attempted to collect taxes from the Water District, but the court straightened out that little misunderstanding as to rights of taxation of one "municipality" by another. On the other hand a Water District has been sued and found liable for negligence in its failure to provide a consistent and regular supply of water.

Mr. Eaton also commented on a later development in which Maine is one of the leader states along with Wisconsin. The Public Utilities Act of 1913 brings every water supply, private and publicly owned, under jurisdiction of the Maine Utilities Commission which is given powers over management, operation and financing of Water Districts and Water Departments, as well as private water companies.

In Maine there are now 31 Water Districts, with increases in the number from year to year. There are but 15 municipal or town water departments, while there remain 83 water companies which must be rendering service satisfactory to the community and the Maine Utilities Commission or else there would be by now many more than the 31 water districts.

Mr. Eaton referred also to the newer Sewerage Districts which are being established in Maine and patterned after the water districts.

Reny Presents Interesting Document

Fred J. Reny, Gen'l Mgr. of the Portland Water District and former employee of the old Portland Water Co., read from a document of 1907, prepared for and distributed by the old Water Co., the lengthy arguments for private ownership and against municipal ownership of public utilities and particularly the water works of a community.

The document, amongst other things, pointed out the dangers of the new Water Districts which operated without constitutional debt limitations.

However, with it all, Portland voted 4 to 1 to establish a water district; at the time already holding 2nd, 3rd, 4th and 5th mortgages on the Water Co. properties at an outlay of $2,500,000.

President Moulton then disclosed the phenomenal financing of the original Portland Water Co. as revealed by the records. Eight original participants actually had invested the grand total of $800 in all in the system. All other financing was through bond sales while the stockholders reaped an income of $1,750,000 in dividends declared prior to sale of the property to the Portland Water District. Although a sinking fund was established, it seemed to have been used to buy an interest in the Portland newspapers.

The Portland Water District is now in the process of refunding its bonded debt with 1¾% bonds and retiring the high yield issues.

As to taxation of Water Districts, Mr. Moulton stated that the courts had ruled that lands and buildings of the district could be taxed while producing properties and distribution facilities could not be taxed.

Of the 139 members and guests attending the Kennebunkport meeting those traveling the longest distance and receiving the customary free dinner to longest traveler were Ralph Monson of Calais and Jim Mitchell of Lubec.

And this reminds us of that Maine lobster and clam feast served at noon at Narragansett House by the sea.

Sam Ellsworth Passes

On Sunday, August 13th, at a rest home in Brattleboro, Vt., Sam Ellsworth, consulting sanitary engineer of Boston, passed on. He was 49 years old; and, at the time of his death, held the distinction of being president of the Boston Soc. of Civil Engineers.

Born in Braintree, Mass., he was christened Samuel Morrison Ellsworth, attended high school and the Mass. Inst. of Technology. Winning his degree in 1916, he joined the Mass. State Dept. of Health, then served in World War I with the "Water Supply Regiment," 26th Engrs., in France.

S. M. Ellsworth

After the war he became associated with Metcalf & Eddy, Engrs., and later with other nationally recognized consulting sanitary engineers. He returned to Metcalf & Eddy in 1926 and held the position of Sr. Asst. Engr. until Dec., 1932, when he established his own consulting engineering offices at 6 Beacon St., Boston.

Sam Ellsworth was a past-president of the New England Sewage Wks. Assn. and also of the Northeastern Section of the Am. Soc. of Civil Engrs. He was at the time of his death serving as secretary of the New England Section of the Am. Water Wks. Assn. and also held the distinction of being president of the Boston Soc. of Civil Engrs. He was a member of the Am. Inst. of Consulting Engrs. and other technical societies.

For several years Sam Ellsworth served as Chairman of the Sewer Board of his home town, Braintree, Mass. He leaves a widow and two sons—Sam, Jr. and Tom.

DEVELOPMENT OF ROCK WELLS

BY J. ARTHUR CARR*
Superintendent, Department of Water Supply
RIDGEWOOD, N. J.

FOR the past several years the Department of Water Supply of the Village of Ridgewood, N. J., has been applying in rock wells some of the mechanics of development which had been heretofore applied only to sand and gravel wells. In every case where the method of development described herein has been used, the yield of the well has been materially increased.

As stated in a paper by the writer presented at the fall meeting of the New Jersey Section of the American Water Works Association in 1941, it has generally been accepted that when drilling was completed in a rock hole nothing further could be done to the well to increase the yield. However, the few experiments completed up to that time had convinced the writer that the yield of many wells in red sandstone formation, such as we have in Northern New Jersey, could be increased by agitation.

Since 1941 seven new wells have been constructed by the Village of Ridgewood. All were developed by agitation after drilling had been completed and in every case the yield was increased in amounts varying from 32 to 180 per cent.

The improvement secured by development was not confined to new wells. In two instances the pumps were removed from wells drilled in 1932 and those wells were given several days of agitation with a resulting increase in yield of 150 per cent.

Developing Procedure

The method used in developing a 12 inch well is briefly as follows: The well wall is first thoroughly scrubbed for its entire depth to remove all loose particles of rock and any clay that may have adhered to the well wall. Scrubbing is accomplished with a specially constructed steel brush—see Fig. 1. The brush is one-half inch larger in diameter than the diameter of the well and is made up of ¼-inch steel bristles.

A 5-foot plugged nipple slightly less than 12 inches in diameter is attached to a steel cage 20 feet long.

*The author is co-chairman of the A.W.W.A. Committee on Deep Wells and Deep Well Pumping.

The Author

The nipple and cage are then attached to a 12-inch hook wall packer and the whole assembly lowered to the bottom of the well on a string of 8-inch pipe. The packer is then expanded against the well wall.—see Fig. 2.

For agitation, or surging, a long heavy, steel valve type plunger is operated inside of the 8-inch pipe. The diameter of the plunger is only slightly less than the diameter of the 8-inch pipe.—See Fig. 3.

Because of the packer at the top of the cage, and the nipple at the bottom of the cage serving as plugs, practically all of the action or surge force created by the plunger is concentrated on the portion of the well wall exposed by the 20 feet of cage. All heavy sand and pieces of rock dislodged are caught in the plugged nipple at the bottom of the cage which acts as a trap.—Fig. 3.

Fig. 1—The Wall Brush

The well is bailed frequently and, when no more material is being brought into the trap, the packer is tripped, the assembly is raised twenty feet and the packer again expanded. The operation is repeated until the entire well wall has been subjected to agitation.

Experiences and Costs

In some instances as much as 4 cubic yards of sand, clay and particles of rock have been removed from the trap in the course of developing a 12-inch well, 350 feet deep.

Naturally the cost of a well per foot of depth is considerably increased when developed by the method described, as in some cases the time expended in development has been equal to, or greater than, the time expended in the drilling operation. The cost of water per gallon produced, however, has in almost every case been less after development.

The accompanying tabulation gives the details of costs for eleven wells both before and after development by the method described.

It may be noted that, while development increased by 60 per cent the cost per lineal foot of well (average for eleven wells), the cost per gallon of water produced was decreased by 15 per cent when average figures are considered.

While the saving in cost per gallon produced is apparent, there is a still further and greater saving effected by a marked reduction in the number of pumps, pump houses, piping, wiring, controls, etc., necessary to deliver the amount of water which may be required. As shown in the tabulation, at a comparatively slight increase in the cost of equipment, the eleven wells can deliver almost twice as much water as would have been delivered had they not been developed.

There is a still further saving to the Ridgewood Water Department reflected in the tabulation. If the

Fig. 2—View of Plunger (left), Upper Section of Cage and Hook Wall-Packer Above

wells, indicated as the Ames group, had not been developed the amount of additional water secured from that field would not have been sufficient for present needs. It would then have been necessary to seek other sources, with a consequent outlay for land, additional supply lines, etc.

Drilling Care Pays

Extreme care is necessary in the drilling operation if a well is to be developed by the method described. The hole must be drilled to full gage as any slight constriction will prevent lowering the cage and packer to the desired depth.

The well must also be perfectly straight for its entire depth. The assembly of trap, cage and packer is about 30 feet over all and it would be impossible to lower it on a string of 8-inch pipe to a depth of some 400 or 500 feet if there were any kinks or dog legs in the well hole.

In the developing operations an experienced well rig operator is also essential. The hook wall packer requires careful handling and operation and, in a 500-foot well it must be set, tripped and reset twenty-five or more times in the complete development process.

Much interesting and often valuable information is secured incidental to development. In most cases two water levels are maintained at all times, one inside the 8-inch pipe from below the packer and one outside the 8-inch pipe from above the packer. Frequently these levels change at each different setting of the packer. By a study of the record of water levels in conjunction with a comparison of drilling samples and samples of material brought in by agitation it is possible to determine at what elevation or elevations water is entering the well.

The work done in Ridgewood was contracted on the day basis, the contractor furnishing all necessary labor, tools and equipment at a flat sum per day. Fortunately the contractor's interest in the new methods being used was as keen as that of the Village authorities. Much of the equipment such as the cage, steel plunger and wall brush were produced by the contractor in his own shop.

The writer wishes to restate his conviction that much can be gained by the described development of wells in the red sandstone of Northern New Jersey, and his belief is that the application of similar methods would be successful in wells drilled in other types of consolidated formation.

Fig. 3—View of Bottom Section of Cage and Sealing Nipple and Trap Below
(*Plunger on Right*)

TABLE 1

Cost Data

Year	Location	Size	Depth	TOTAL WELL COST Before Development	TOTAL WELL COST After Development	GALLONS YIELD Before Devel.	GALLONS YIELD After Devel.	COSTS PER LIN. FT. Before Devel.	COSTS PER LIN. FT. After Devel.	COSTS PER GALLON Before Devel.	COSTS PER GALLON After Devel.
1940	Farview Street	12&10	402	2,240.50	2,835.50	290	370	5.57	7.05	7.73	7.66
1941	Wortendyke No. 2*	12,10,8	1,137	3,150.52	5,060.52	80	229	2.77	4.45	39.38	22.10
1941	Ames No. 2	12	480	1,756.82	2,996.82	70	175	3.66	6.24	25.10	17.12
1941	Ames No. 6	12	455	2,169.07	3,509.07	150	250	4.77	7.71	14.46	14.04
1941	Ames No. 9	12	350	1,638.12	2,603.13	80	170	4.60	7.43	20.48	15.31
1933	Cedar Hill No. 2†	12	399	2,682.26	3,997.26	100	250	6.72	10.02	26.82	15.99
1932	Cedar Hill No. 3†	12	500	2,801.90	4,196.00	100	250	5.60	8.39	28.01	16.78
1942	Ames No. 3	12	352	1,476.74	2,831.74	180	360	4.20	8.04	8.20	7.87
1942	Ames No. 5	12	350	1,883.28	3,332.77	185	245	5.38	9.52	10.18	13.60
1943	Ames No. 1	12	350	1,934.64	3,177.89	65	180	5.53	9.08	29.76	17.65
1943	Ames No. 7	12	352	1,996.99	3,429.75	150	260	5.67	9.74	13.31	13.19
	Totals and Averages	..	5,127	23,730.85	37,970.45	1,450	2,739	4.62‡	7.40‡	16.36‡	13.86‡

Remarks: *From 215'-1,137' only. Original 215' drilled 1926.
†Drilled 1932 and 1933; Developed—1942.
‡Averages.

EXAMINING 100 ML. PORTIONS OF WATER

By H. W. POSTON
Ass't. Water Works Sup't.
OTTUMWA, IA.

THERE has been much comment on the planting of 100 ml. portions in bacteriological examinations of water samples.

At Ottumwa we have developed and used for over one year a procedure which may be of interest to readers of *Water Works & Sewerage*. The procedure has proved quite satisfactory and saved much time as well as given, what we believe to be, a more complete knowledge of the quality of the water.

100 ml. portions are planted only on water leaving our plant. Confirmations on presumptive tubes are made with brilliant green bile. Five one-hundred ml. portions are collected each day, one being taken every two hours during the day.

The procedure of sampling and preparation of the samples before incubation is shown in the photographic series accompanying this article.

Procedure

(1) A sterile 8 oz. bottle with inverted fermentation tube (Pre-war aluminum caps are used to eliminate corrosion during sterilization.)

(2) Collection of 100 ml. portion in the sterile bottle. (Bottle has 100 ml. and 135 ml. marks.)

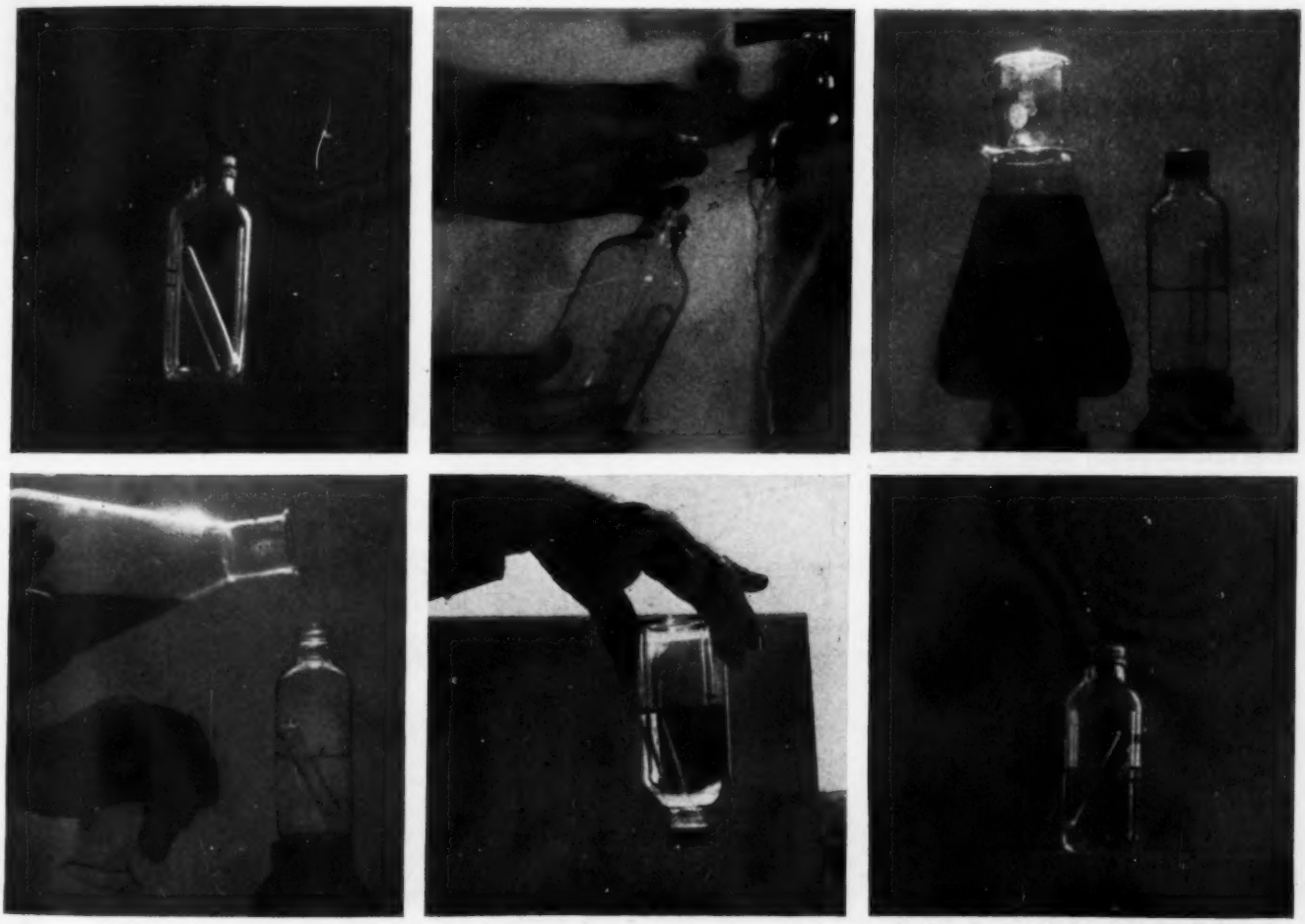
(3) Sterile *quadruple strength* broth and 100 ml. sample.

(4) Adding 35 to 40 ml. quadruple strength broth.

(5) Inverting to fill fermentation tube.

(6) Sample ready for incubation.

The above procedure eliminates the need for (a) transfer of the 100 ml. portion from a sample bottle to the fermentation vessel; (b) sterile pipettes, (c) sterile sample bottles, and (d) dechlorination of sample—the latter being accomplished with the culture broth.



Sampling and Enrichment of 100 ml. Portions of Water

From left to right, top and then bottom strip, the six steps are described under "Procedure." Note the 100 ml. mark, and the 135 ml. mark on the sampling and incubation bottle. No measuring cylinders or pipettes are used in measuring the sample or in adding the broth.

Pipe Laying

MOBILE HAS NEW FILTRATION PLANT

And Almost Half Million Feet of New Cast Iron Mains as Part of $2,000,000 Improvement Program

MAJOR extensions have been made to the water works system of Mobile, Ala., in order to take care of a wartime increase in population from 115,000 to an estimated 250,000. The city's demand for water has increased from a pre-war normal of 6 m.g.d. to 12 m.g.d and is expected to reach 18 to 20 m.g.d. during this summer of 1944.

As part of a $2,000,000 improvement program, a new filtration plant with a capacity of 20 m.g.d. and a reservoir have just been completed. Also approximately one half million feet of cast iron mains have been laid to extend and strengthen the system.

In addition a new 24-inch main is being laid a distance of seven miles from the Bienville reservoir to downtown Mobile, and another 10 m.g. reservoir for raw water is being built.

The new filtration plant has 10 filter beds rated at 2 m.g.d. per day each, and a concrete clear well of 1,000,000 gallons capacity. The source of water is an impounding reservoir on Eight Mile Creek, from which 7,500 feet of 24-inch cast iron pipe was laid as a feeder main to the filtration plant. The water is lifted to the filtration plant by centrifugal pumps.

The water department has laid many miles of new mains including 8 miles of 24-inch feeder main and a 12-inch cast iron main to Brookley Field. As hundreds of new housing projects have been erected in the city to take care of the influx of shipworkers and other workers in war plants, it has been necessary to lay thousands of feet of small feeder lines, mostly 2, 4, 6 and 8-inch sizes. One of these (Mobile Houses, Inc.) consisted of 578 dwellings units and required 30,000 feet of pipe, 18,000 feet being of two-inch cast iron and 12,000 feet was of 4, 6 and 8-inch sizes.

A. H. Guion & Co. of Charlotte, N. C., were contractors on the filtration plant. The engineers on the project were J. B. Converse & Co. of Mobile, assisted by Polglaze & Basenberg, of Birmingham.

The superintendent of the Mobile Water Dept. is E. M. Stickney.

Photographs and this account were contributed by Geo. H. Watson, Mgr., Southern News Service, Birmingham, Ala.

Mobile's New 20 m.g.d. Filtration Plant

MEASUREMENT OF SEWAGE FLOW IN OPEN CHANNELS

Parshall Flume, Using "Free Flow" Condition Gives Ready Measurement for Silt-Bearing Waters

By J. TARRANT
RUISLIP, ENGLAND

THE Parshall measuring flume described by R. L. Parshall in Bulletin 423 of the Bureau of Agricultural Engineering has been proved to be a reliable method of measuring the flow of water in channels, and is especially useful where the water carries solids in suspension.

Comparison with Weirs and Notches

The older method of measuring the flow in channels by means of weirs or notches has the disadvantage that the barrier across the channel carrying the weir or notch forms a pocket where sediment may collect, with detrimental effects on the accuracy of measurement. The Parshall flume has no such obstructions and can be so proportioned that the velocity of flow carries forward the silt and maintains a clear channel.

There is also the question of head loss which, when pumps are used for delivering water or sewage on to a plant or when it is desired to avoid pumping, may be an important consideration. The head lost in a flume, by utilizing the full allowable submergence at the outlet, is very considerably less than that imposed by the use of a weir or a notch.

The principle of measurement is similar to that of the weir in that the head over a sill is measured, and this measurement is used either alone or in conjunction with a second head reading taken downstream of the sill for the estimation of the rate of flow. The use of two readings means that (because the downstream head may rise to a value equal to about 95 per cent of the upstream head) the loss of head can be reduced to an extremely low figure, but the indicating or recording of the flow is complicated as compared with indicating or recording by a single head reading.

Head Loss

When measuring the flow by a single head (the "free flow" condition) the loss of head may not be reduced below a figure which is a percentage of the head on the sill for each rate of flow. (The figures are given later.) This head loss is such that the level of water downstream is not allowed to rise to the point where it will have any effect on the volume of the discharge as indicated by the head on the sill. That is to say, for a given head on the sill the flow remains constant as the tail or downstream water level is progressively raised until, at a certain submergence, the flow begins to decrease.

So, within the limit imposed by this condition of noninterference, the discharge may be measured by a single head reading. The maximum level to which the downstream water may be allowed to rise is 50 per cent of the upstream head in the case of 3-in., 6-in. and 9-in. flumes, and 70 per cent for flumes from 1 ft. to 8 ft. in width. The loss of head is the difference in level between the water entering and leaving the flume, and this is equal to 50 per cent or 30 per cent of the head on the sill, according to the width of the throat.

TABLE I
Dimensions of 3-in., 6-in., and 9-in. Flumes
See Fig. 1

W	B	C	D	E	F	G	K	N
in.	ft.-in.	ft.-in	ft.-in.	ft.-in.	ft.-in.	ft.-in.	in.	in.
3	1-6	7	10-3/16	1-3	6	1-0	1	2¼
6	2-0	1-3½	1-3½	1-6	1-0	2-0	3	4½
9	2-10	1-3	1-10⅝	2-0	1-0	1-6	3	4½

Selection of Suitable Size

In earlier issues of *Water Works & Sewerage* the use of the Parshall

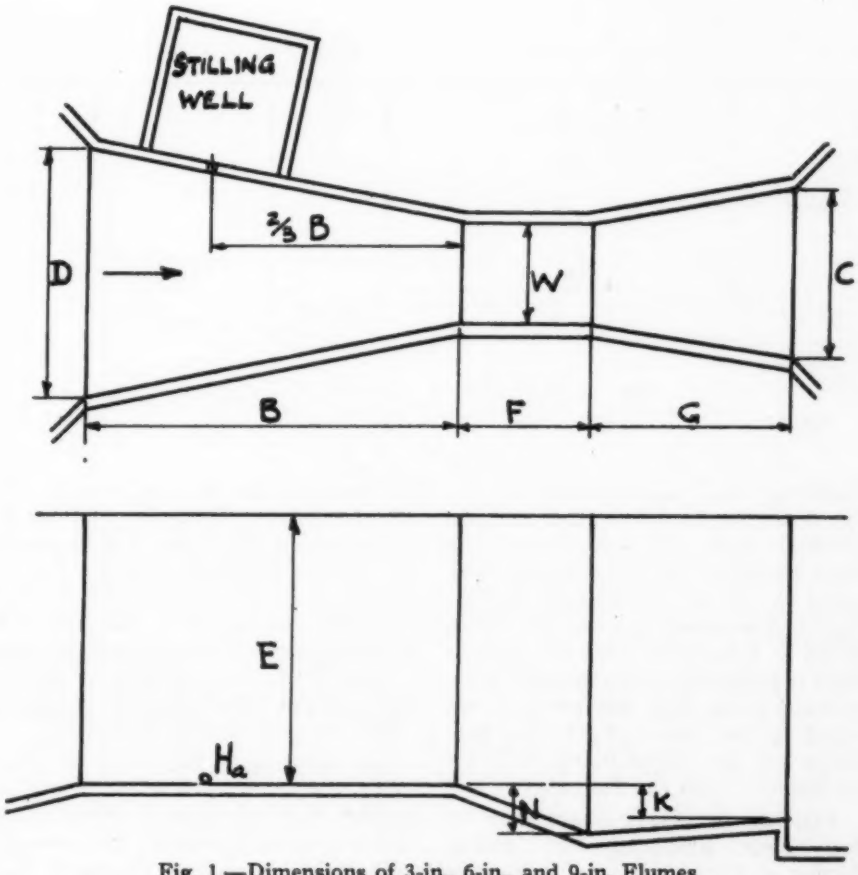


Fig. 1.—Dimensions of 3-in., 6-in., and 9-in. Flumes
(*See Table 1 above*)

TABLE II

W	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75
n	1.522	1.5308	1.5381	1.5443	1.5496	1.5544	1.5586	1.5625
W	3.0	3.25	3.5	3.75	4.0	4.25	4.5	4.75
n	1.5660	1.5693	1.5724	1.5752	1.5778	1.5803	1.5826	1.5849
W	5.0	5.25	5.5	5.75	6.0	6.25	6.5	6.75
n	1.5870	1.5890	1.5909	1.5928	1.5945	1.5962	1.5978	1.5994
W	7.0	7.25	7.5	7.75	8.0			
n	1.6009	1.6024	1.6038	1.6052	1.6065			

Table II gives the value of "n" $= 1.522W^{.026}$ for widths of flume from 1 foot to 8 feet in steps of 3 inches.
"W" is given in feet, and "n" is the value of the index to "H" in the formula, $Q = 4WH^{1.522W^{0.026}}$ which is thus reduced to, $Q = 4WH^n$, using second-feet units, so facilitating logarithmic calculation.

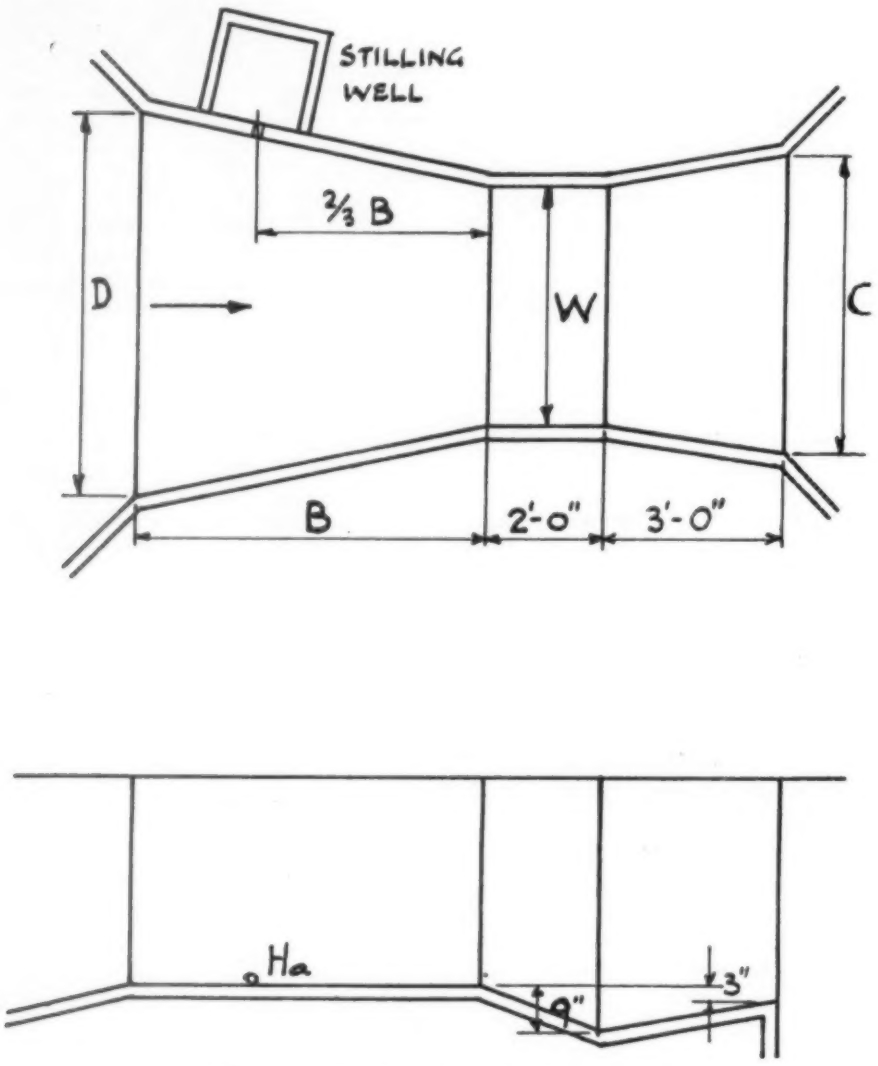


Fig. 2—Dimension of 1 ft. to 8 ft. Flumes
(See Formulas for B, C, and D)

flume for the measurement of sewage flows has been described and the formulas given. The selection of the most suitable size of flume for any given set of flow conditions, involving consideration of channel width, depth of flow in the channel, loss of head permissible, possible future increases in the flow, and so on, is assisted by the use of charts, the final sizing of the flume being done by calculation from the formula.

The accompanying chart, Fig. 3, has been prepared for sizing flumes of 3-in., 6-in., and 9-in. wide and from 1 ft. to 8 ft. wide (the width referred to is always the throat width). The tables in Bulletin 423 give the flows for various heads for flumes measured in exact feet of throat width from 1 ft. to 8 ft., but for the selection of a flume to suit particular conditions of head and discharge it may be useful to be able to select a size which may be anywhere between 1 ft. and 8 ft. wide.

In selecting a flume for a given duty and set of conditions it will be found that the smaller W is made for a certain discharge the greater will be the head loss, assuming that allowance for the maximum submergence is made in each case. The depth of flow in the channel downstream of the flume and the level of the floor in the channel may be convenient points to take as the basis for sizing, working back to the water level upstream and the level of the crest or sill. Use of the chart means that a number of different sets of conditions may be tried out quickly to determine the best size of flume for the job in hand.

The range of heads covered by the chart is the same as shown in the various tables in Bulletin 423 and the formulas are those there given for "free flow" conditions, viz.:

For 3 in flumes—$Q = 0.992\ Ha^{1.547}$
For 6 in. flumes—$Q = 2.06\ Ha^{1.55}$
For 9 in. flumes—$Q = 3.07\ Ha^{1.53}$
For 1 ft. to 8 ft. flumes—$Q = 4\ W\ Ha^{1.522W^{0.026}}$

where
Q is the discharge in cubic feet per second.
W is the width of the throat in feet.
H is the head on the sill in feet.

These formulas, of course, are the same as given in Bulletin 423 but are repeated here in order to make these notes as complete as possible.

It is mentioned in the bulletin that the width of the throat will, generally, lie between one-third and one-half the width of the channel, and this makes a good starting point, but this rule will not apply for extremely wide and shallow, or deep and narrow, channel flows, and will be governed by considerations of head loss, and so on, as mentioned earlier. The Bulletin recommends in considering the loss of head that a submergence of 60 per cent be taken as the practical limit for flumes between 1 ft. and 8 ft. wide so as to allow for possible fluctuations in flow before the conditions affecting the accuracy of measurement by the single head reading would be reached. Similarly the practical limit for 3 in., 6 in. and 9 in. wide flumes might be taken as 40 per cent or 45 per cent submergence.

The head Ha over the sill or crest is read at a point two-thirds the distance back from the crest to the inlet of the converging section, and, if a connection is taken to a stilling well for the float operation of an indicator or recorder, the connection is taken through either side wall, just above the floor, the end of the pipe being flush with the wall face.

Table I and Fig. 1 give the dimensions of the 3-in., 6-in. and 9-in. flumes, those dimensions common to all three sizes being given in the figure.

Dimensions of flumes between 1 ft. and 8 ft. wide are given for exact feet widths in the Bulletin, but for

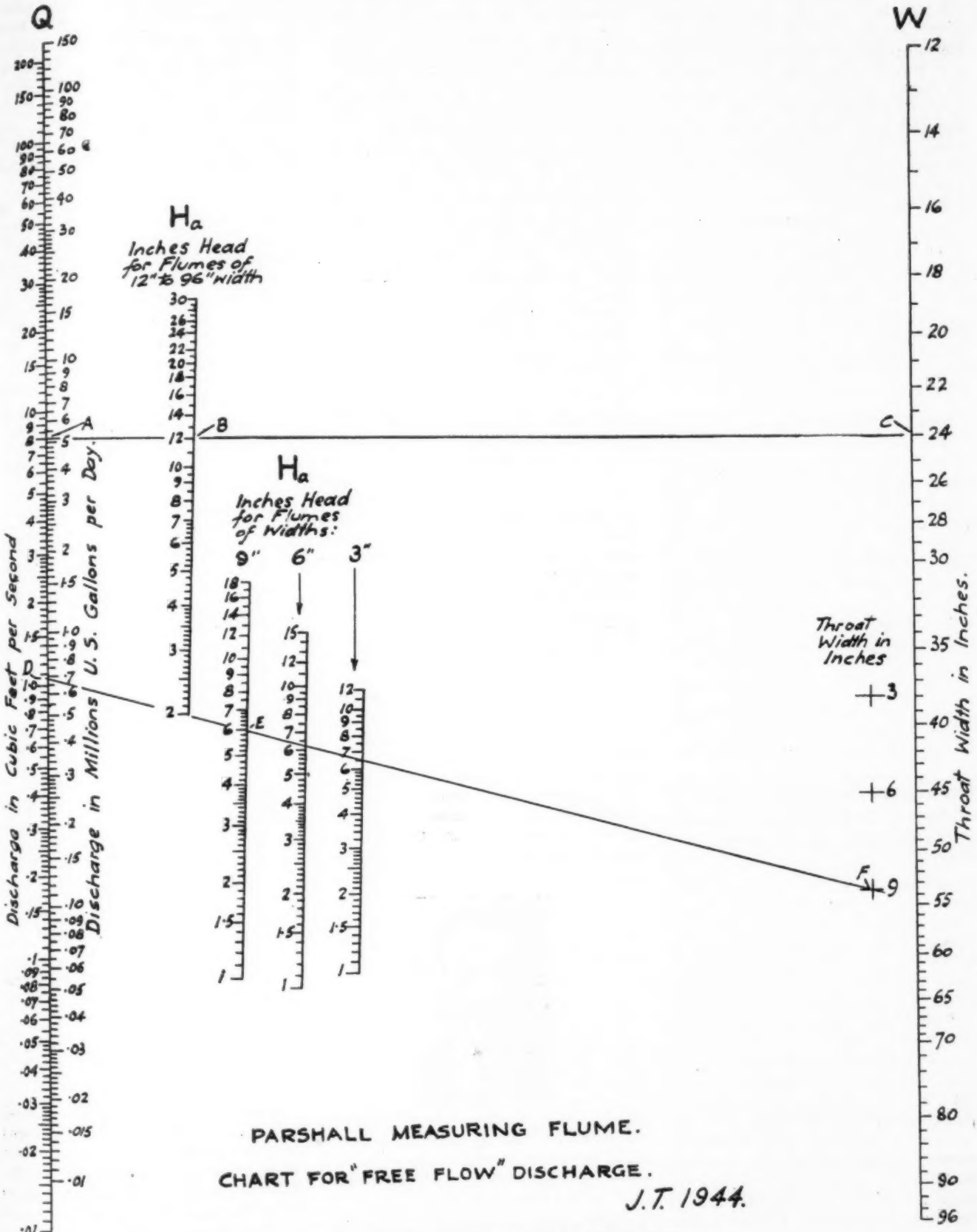


Fig. 3—Chart for Free Flow Discharge of Parshall Flume

calculating the dimensions "B" and "D" for flumes of any width between these limits the formulas which follow are offered. The throat width "W" is used as the basis of each formula and so when the width has been decided the other dimensions are quickly obtained. "W" is taken in inches and the other dimensions are derived in inches. The results compare very closely with the dimensions given in the Bulletin for widths of even feet, and so may be used for intermediate widths.

$B = 0.49\ W + 47''$
$C = W + 12''$ (See Table I. Bull. 423)
$D = 1.196\ W + 18.84''$

Thus, for a 30-in. flume: $B = 0.49 \times 30$ in. $+ 47$ in. $= 61.7$ in.; $C = 30 + 12 = 42$ in., and $D = 1.196 \times 30 + 18.84$ in. $= 54.72$ in. Positions of dimensions "W," "B," "C," and "D," and dimensions which are common to all sizes between 1 ft. and 8 ft. flumes are given in Fig. 2.

Using the Chart: Fig. 3:

The use of the chart is illustrated by the lines A.B.C. and D.E.F. which cross the scales. A.B.C. shows that a flume 24 in. wide will pass 8.0 cu. ft. per second or 5.17 mgd. (U. S.) when Ha is 12 in. Line D.E.F. is used to show the flow through a 9-in. flume when the head is 6 in. This equals 1.06 cu. ft. per second or 0.685 mgd.

Similarly, for 3 and 6-in. flumes, the flow is obtained by using the appropriate points for the width and the corresponding scale for the head. Thus, it will be clear that one scale is used for the flows for all sizes with separate scales for the head for 1 ft. to 8 ft., 3, 6 and 9-in. widths, respectively. A scale of widths is given for 1 ft. to 8 ft. with points for 3, 6 and 9-in. widths, no intermediates being given for these, each of which is set out according to the formula given for that size.

In the stilling well, shown in Figs. 1 and 2, a scale may be placed against the wall, having its zero at the level of the flume crest. This may be calibrated from the chart or from the calculated rate from the formula, depending on the degree of accuracy required. A mechanical indicator operated by a float in the well may be mounted above the well to give a continuous indication or record of the flow.

The location of the measuring flume in the channel is a matter requiring some consideration. The Bulletin suggests that a certain length of straight channel should precede the flume but is not specific about this. The approach should be arranged so as to give conditions free from turbulence.

Velocity of approach:

The velocity of the water in the channel leading to the flume should be less than the critical velocity, and, with this limitation, a variation of as much as 300 per cent in the velocity of approach was found to have no effect on the discharge. Where the depth in the approach channel is low and the velocity high, the selection of a flume size can be made which will increase the head, and therefore the depth in the approach channel, so decreasing the approach velocity to a suitable figure.

Larger Flumes—Dimensions of wider flumes, that is, of widths greater than 8 ft., are not calculated from the formula as given above. Figures for flumes from 10 to 50 ft. in width are given in Bulletin 386 of the Bureau, the largest having a capacity up to 3,000 cu. ft. per second.

It is hoped that these notes will be found useful as a supplement to articles which have appeared earlier and which have described installations incorporating the Parshall flume.

References:

Bulletins 386 and 423, Bureau of Agricultural Engineering, R. L. Parshall.

Water Works and Sewerage, July, 1936, N. C. Witwer.

Water Works and Sewerage, May, 1933, Glen D. Holmes.

Water Works and Sewerage, Oct. 1935, N. L. Nussbaumer.

Water works and Sewerage, Data Section, 1940, S. T. Barker.

Dr. Gehm Becomes Technical Advisor to National Council for Stream Improvement

Within recent weeks, Dr. Harry W. Gehm, formerly Research Associate in the Department of Water and Sewage Research of the New Jersey Expt. Station, New Brunswick, N. J., has been appointed Technical Director of the National Council for Stream Improvement (of the Pulp, Paper, and Paperboard Industries), Inc.

The National Council for Stream Improvement was organized more than a year ago for the purpose of studying waste treatment and utilization in the Pulp and Paper Industry. Organized with a board of governors, executive committee, technical planning committee, and regional committees, Council membership is open to any company in the United States or its territories engaged in the manufacture of pulp of any kind or character used in paper, paperboard, or allied products, or any company engaged in the manufacture of paper or allied products. Dues are assessed according to annual tonnage of products,

Dr. H. W. Gehm

and the rate per unit varies according to the type of product.

The executive staff is located at 271 Madison Ave., New York 16, N. Y., and consists of Russell L. Winget as Executive Secretary, and Dr. Gehm as Technical Advisor. Dr. Gehm will represent the Council in research activities and arrangements have already been made with the Mellon Institute of Pittsburgh for extensive research on all types of waste from the manufacture of various products of this industry. While stream improvement is the primary objective it is hoped that byproducts of value and/or recovery of materials for re-use in the production cycle will yield a compensating return.

"All 'Cause of This Here Filterin' They Do"

Mississippi rivermen are colorful characters. Lanky, gaunt-cheeked Captain Barney, for instance, who every evening lowers a tin bucket into the muddy river and drinks his fill of the thick brown liquid. "Keeps my health agoin' good," he says. "It's this here filterin' they do to water that causes all the sickness there is nowadays. Just takes all the strength out of it."—Ben Lucien Burman.

(From the "Readers Digest")

SEWAGE WORKS FEDERATION PROGRAM SHAPING UP

ALTHOUGH the final details of the program for the Fifth Annual Meeting of the Federation of Sewage Works Assns. have not yet been released, the program is practically complete for the meeting to be held in Pittsburgh on Oct. 12-14.

A pre-convention get-together is scheduled for Wednesday evening, Oct. 11, at the Hotel William Penn, which will serve as headquarters for both technical sessions and exhibits. The Federation Luncheon on Oct. 12th will have as the featured speaker, Dr. A. H. Stewart, Secy. of Health, Pennsylvania Department of Health. Dr. Stewart will speak on various aspects of stream pollution control.

At the annual banquet to be held on Friday evening, presentation of the various awards will be made. Thursday evening has the usual smoker scheduled, and on Friday noon the Pennsylvania Sewage Works Assn. will hold its luncheon.

Technical Sessions

The technical sessions will be introduced with a Symposium on Operation of Sewerage Systems. This session will be presided over by Dr. A. E. Berry, Director, Sanitary Engineering Division, Ontario (Canada) Dept. of Health, and Vice President of the Federation.

Among the topics scheduled on this symposium is one concerned with locating lost manholes, to be presented by Eugene T. Cranch, Dir. of Public Works, New Rochelle, N. Y. The problems of infiltration and storm overflow control is another topic. It will be introduced by Ralph W. Horne, of Fay, Spofford, & Thorndike, Engrs., Boston.

The Friday morning program will be devoted to topics on sewage treatment plant operation. Mr. LeRoy Van Kleeck, San. Engr., Conn. State Dept. of Health, will read a paper on "Safety Equipment in Sewage Treatment Plants." Norval E. Anderson, Engr. of Treatment Plant Design, Sanitary District of Chicago, will discuss the "Design of Final Settling Tanks for Activated Sludge Treatment Plants." On this same session, Dr. H. Heukelekian, Associate, N. J. Agricultural Experiment Station, New Brunswick, N. J., will discuss the Characteristics of "Biological Films on Standard Rate and Biofiltration Trickling Filters."

Industrial Waste Symposium

An Industrial Waste Symposium will be featured on the Friday afternoon session. Federation President A. M. Rawn, General Manager and Chief Engineer, Los Angeles County Sanitation Districts, will preside. Dr. F. W. Mohlman, Dir. of Laboratories, Sanitary District of Chicago, will conduct the symposium. Six papers are scheduled for this particular session.

"Packing House Waste Treatment" will be discussed by Kenneth V. Hill of Greeley and Hansen, Engrs., Chicago, with particular reference to one plant in Minnesota and another in North Dakota.

"Handling and Treatment of Oil Refinery Wastes" will be the topic presented by W. B. Hart, Supt. of Acid, Gas, and Drainage, Pennsylvania Dept. of Health.

"Industrial Waste Treatment in Connecticut," will be discussed by Wm. S. Wise and "Treatment of a Chemical Industry Waste" will be described by T. J. Powers, Waste Disposal Dept., Dow Chemical Co., Midland, Mich.

Florida's Citrus Canning Waste Problem will be described by Dr. R. S. Ingols, Research Fellow, Florida Citrus Commission.

Tentatively scheduled for this session also are papers dealing with the treatment of waste from synthetic rubber plants.

Thursday Morning Session

The convention will open with a business meeting at the Hotel William Penn on Thursday morning, Oct. 12. In addition to the general business of the Federation there will be a Final report on "Blueprint Now" by Charles A. Emerson and George J. Schroepfer, Federation representatives on the Committee on Water and Sewage Works Development. E. L. Filby, who was Field Director for the Committee during the past year, will discuss the report.

Operators' Breakfast

The Operators' Breakfast Forum will close the convention on Oct. 14, Saturday morning. Featured subjects will be the discussion of increased industrial waste loads on treatment plant processes and discussion of the 1943 report of the Committee on Operators' Qualifications.

Pict-on? Well, He Was and Is

It's pronounced "picked on." And he was that in a way, because on page 253 of our July issue we had "Bill" Picton, Regional Engineer, Water Div., WPB, misplaced and mis-labeled as F. K. Ellis, Supt. of Public Works, Sumter, S. C. This all occurred in the report of the Southeastern Section meeting where Picton was on the program and Ellis was voted the Fuller Award.

W. L. Picton

Even in the face of paper (space) scarcity we think it's only fair to run this correction so that those of our readers who do not know "Bill" Picton will get a proper introduction now.

What about Ellis? Well, that's still a mystery in this quarter, for we can't even find the picture of Ellis —mislabeled or otherwise.

Denver Water Board Plans Construction

Denver, Colo., is in the forefront of those cities which have definite plans for post-war construction. These plans, for the next five years, include work on Development of Western Slope Water, Conduits, Moffatt Tunnel, Filtration, City Pipe System, West Denver, Mechanical, Electrolysis Mitigation, and Contingencies. The proposed expenditures to cover these various items for the next five years are shown in the following table:

Year	Amount
1945	$978,160
1946	734,280
1947	936,570
1948	864,800
1949	989,730
Total	$4,503,540

REBUILDING SECTION OF TRUNK SEWER WHILE IN SERVICE

By MAJOR LESLIE E. WEST*
Sanitary Corps, U. S. Army
CARLISLE BARRACKS, PA.

WHEN sewage runs on the surface of the streets the public gets pretty much upset about it . . . and, good reason to. So, with overflowing manholes the telephones begin to ring . . . tempers get short . . . public officials get gray hair and costly litigation often results. For this is the American way of life.

It might not be so bad if sewer overflow occurred only at rare intervals, but when, with every heavy rainfall, manhole covers begin to pop off and the traces of domestic wastes are spread out for one and all to see, a problem for the engineer exists. Repeated occurrences cannot be dismissed as "An act of God" forever. Every thinking person *knows* there is a reason for them. So it becomes the engineer's job to find out exactly what that reason is and what's to be done about it.

The causes may be an excessive entry of storm runoff or infiltration of ground water. Storm water entry may be widespread and defy detection, or it may be caused simply by the ordinary submergence of a number of vent drilled manhole covers, but the explanation may not end at this point. Sewerage systems ordinarily will be found to contain those trouble creating "bottlenecks" due to undetected obstructions, grade changes, etc. And, even improper design and construction is not entirely unknown to the maintenance force. The immediate cause of an overflow at some "sore spot" will in all likelihood be found to be some defect which brings the hydraulic gradient above the surface of the ground at that point, and may well be subject to correction if thoroughly investigated.

The Joint Meeting of Municipalities in Essex and Union Counties (N. J.) has built and operates the Joint Sewerage System, with a sewage treatment plant in Elizabeth, N. J., for its member municipalities.

In the maintenance of its 42 miles of trunk sewers (serving almost 400,000 persons) many interesting maintenance problems have come up from time to time which serve to cover the point in question.

The Author

A Sewer Runs Up-hill —Believe It or Not!

In one case it was found that a portion of a 40-year-old 30-inch diameter brick sewer, where overflows were occurring too frequently for comfort, was in fact running up-hill. In one section, between manholes 83.6 feet apart, the elevation of the invert at the downstream manhole was actually 0.23 feet higher than was the invert at the upstream manhole.

The design slope of the line through this particular section was 0.14 feet per hundred. That something was wrong in the area was obvious from even a casual inspection of flow velocities, depths of sewage and deposits of grit which formed regularly at the spot. When careful measurements and levels were run on the sewer the difficulties were found to lie in a section a little more than 300 feet in length.

When originally built the brick sewer ran through farmland, practically on the surface of the ground and was covered with an embankment. The growth of the community, however, caused the development of almost all available property and the passing of time found the farmland filled in and the sewer covered with a paved street, by the time that overflows first began to occur. The only way of improving the situation proved, upon study, to be the complete rebuilding of the defective section.

The rebuilding of this much sewer was considered too large a maintenance job for the regular maintenance force to do, while still having to take care of routine operations, and so it was decided to do the work with WPA assistance. The average amount of flow being carried by the pipe at the time was about 3 million gallons per day, and no existing means of diversion of this flow were possible.

Preliminary plans called for the reconstruction of the whole section with cast iron pipe because of shallow cover and certain downstream flow conditions which had a tendency to cause pressure conditions (surcharge) in the vicinity. It was the object to restore the line to designed capacity and to remove as much of the restriction to flow as possible. As the work progressed, however, a change from cast-iron to slip-joint reinforced concrete pipe was made, primarily because of its availability nearby, and also lower cost.

Provision of By-Pass

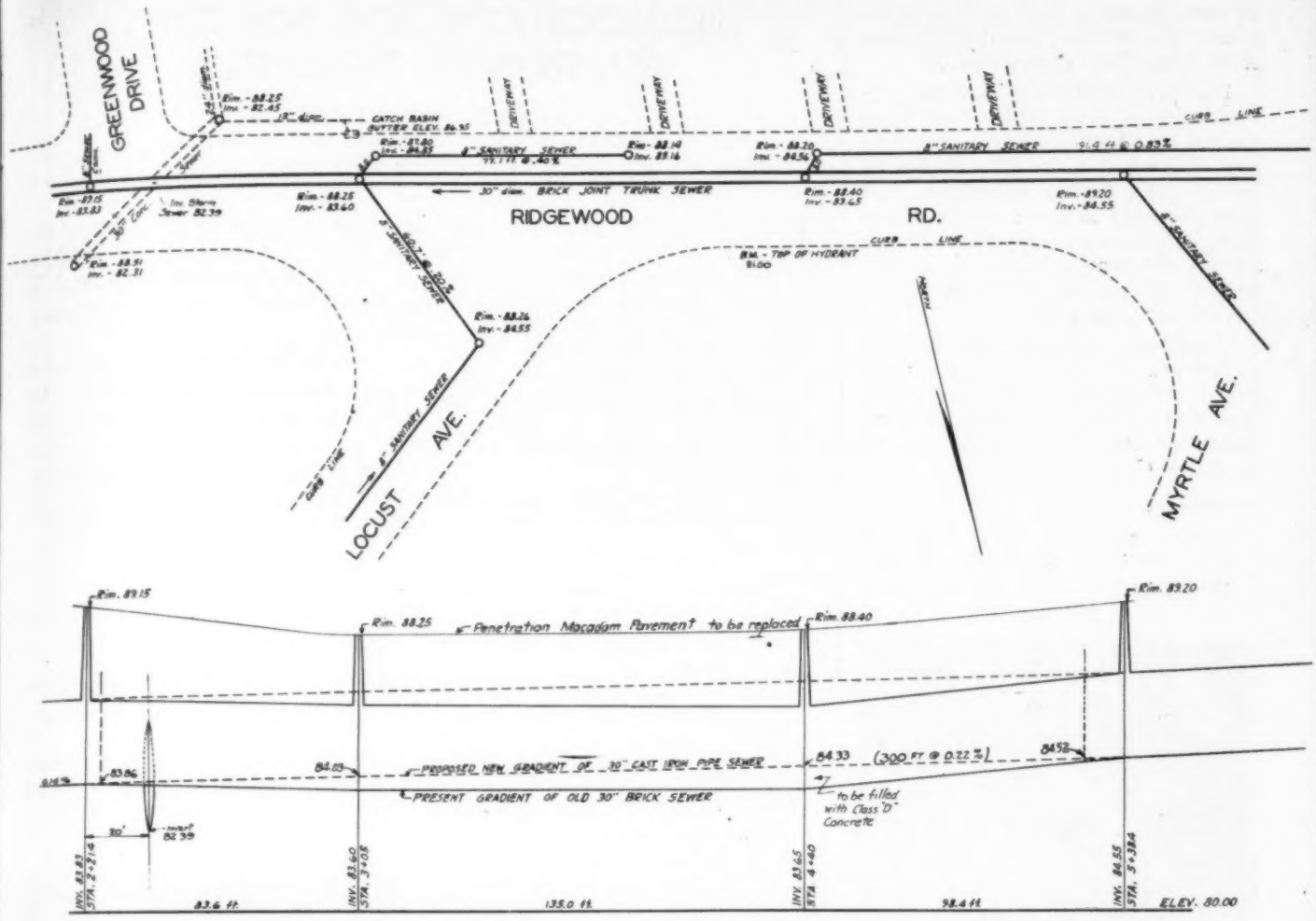
Before any demolition of the existing brick sewer could be begun it was necessary to by-pass the sewage around the defective section, and this by-pass had to be capable of handling an average daily flow of from 3 to 10 million gallons safely for the entire duration of the work.

After deciding on which side of the work the bypassed flow could best be handled a wide trench was dug to the desired depth. A wooden box-flume of 2″ x 10″ planking was then built alongside, and the bottom and sides lined with heavy tarpaper to minimize the volume of leakage which might occur. A flume cover was provided to prevent dirt and stones from being dumped into it and being carried downstream into the sewer. Sandbags carefully placed and caulked with jute, effected the desired diversion with practically no appreciable leakage into the open trench (Fig. 1). It was easily possible to keep the portions of the excavation in which work was going on in excellent working condition by the occasional use of a 2″ centrifugal pump.

Reconstruction

After the sewerage was taken care of, the old brick sewer was then broken up with pneumatic pavement-breakers and with hand tools and re-

*Former Chief Engineer, Joint Meeting Sewerage System, Elizabeth, N. J.; Now Instructor, Army Field School for Military Sanitation.



Plan and Profile of Replaced Section of Joint Trunk Sewer, Showing New Gradient, Etc.

moved. That portion of the bottom which would clear the underside of the new concrete pipe was, however, retained to serve both as a temporary underdrain and excellent foundation for the new pipe.

Fig. 2 shows the typical grit deposits which were found to be spread throughout the old sewer most of the time during which difficulties had occurred, in spite of the efforts of the maintenance force to keep it clear by conventional methods.

When all of the broken brick and other debris had been removed the new concrete pipe was laid to accurate line and grade. Joints were made of plastic compound as well as

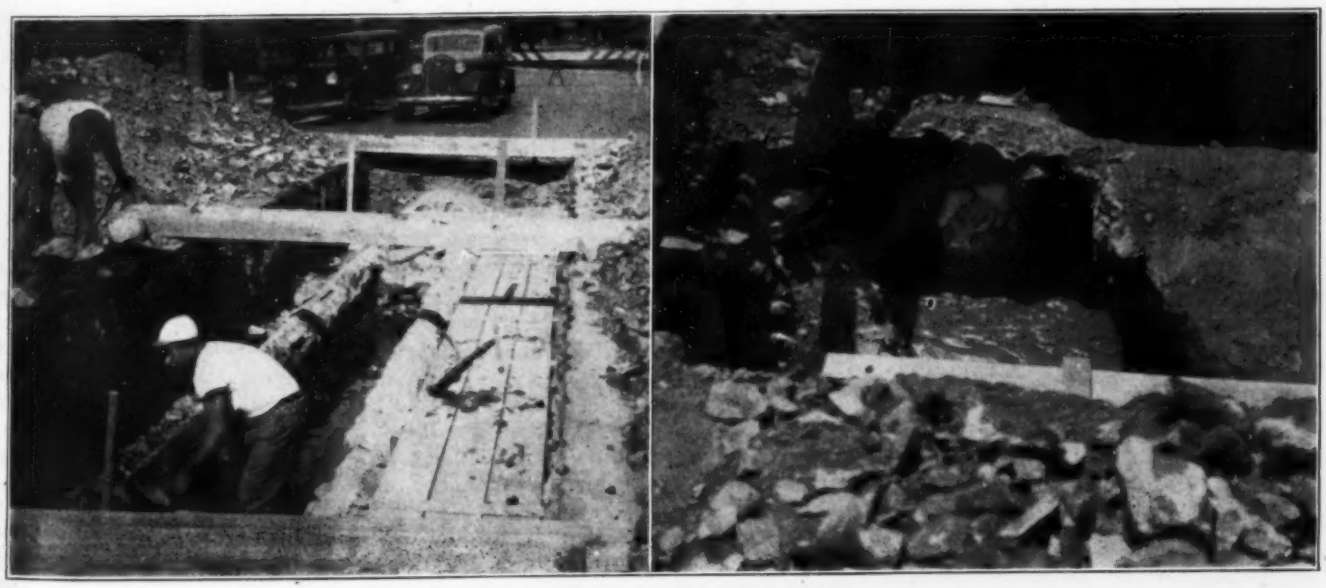


Fig. 1. Upper and Lower Ends of Bypass

(Note—Sandbag bulkhead at upper end of wooden flume bypass in left view. Right view is the down-stream terminus of box flume bypass.)

of neat cement, and the space between the old and new sewers was filled with Class D concrete.

Primarily because of lack of sufficient cover some difficulties were caused by water and gas connections and these had to be altered during sewer pipe laying operations and then restored to their original position. This was made possible because of the different thicknesses between the old brick sewer and the new reinforced concrete pipe.

Temporary bridges were built at driveways so that property owners could cross with their automobiles and every effort was made to lessen their inconvenience and damage to property (Fig. 3).

Manholes

Where manholes were required these were built "box type" of reinforced concrete with the ceiling of

Fig. 2. Removing Old Brick Sewer—First Stage

(Note grit deposit in bottom)

the chamber forming the subgrade of the penetration type street pavement. Manhole covers were of the pressure tight variety and were cast into the roof slab. This was considered necessary to provide as much room as possible for men to work in during future maintenance operations. It had been almost impossible for them to do an efficient cleaning job with the facilities which had previously been afforded, and now was the time to make the necessary corrections (Fig. 4).

Fig. 4. Reinforced Concrete Manhole Under Construction

For example, the original manholes had had only a couple of ladder rungs high up and no benches for standing out of the flow, and besides were so small in diameter that it was impossible for a man to bend over in them. The new manholes are a great improvement.

Near the downstream end of the work some complications were caused by the presence of a storm sewer crossing beneath the trunk sewer, with less than 18 inches of available clearance for the 30″ concrete pipe. To take care of this situation one length of cast iron pipe was used to provide the maximum clearance for the storm sewer. After the trunk sewer was rebuilt and the flow restored, the storm sewer crossing was completed with sufficient cross-sectional area provided in what is commonly known as a transitional depressed section.

At no time during the entire course of the work were any difficulties caused by storm runoff or failure of the bypass to carry all of the sewage load. Upon completion of the pipe laying the sandbags were removed and the openings in the sides of the trunk sewer were sealed by using an inside form of flexible galvanized iron sheet metal and pouring concrete made with quick-setting cement. Occasionally where leakage caused some trouble in washing out cement before it had set, the use of bricks was resorted to.

The flume was then dismantled and most of the lumber was salvaged for future maintenance operations. Back-

Fig. 3. Removing Old Sewer—Second Stage

(Note temporary vehicle bridge crossing)

fill was carefully replaced, puddled and compacted with pneumatic tampers and, after a short period, the penetration type pavement was replaced. The entire cost of the work (exclusive of labor) for materials, including replacement of the pavement was $1845.05.

NOMOGRAPH FOR SOLVING MANNING'S FORMULA

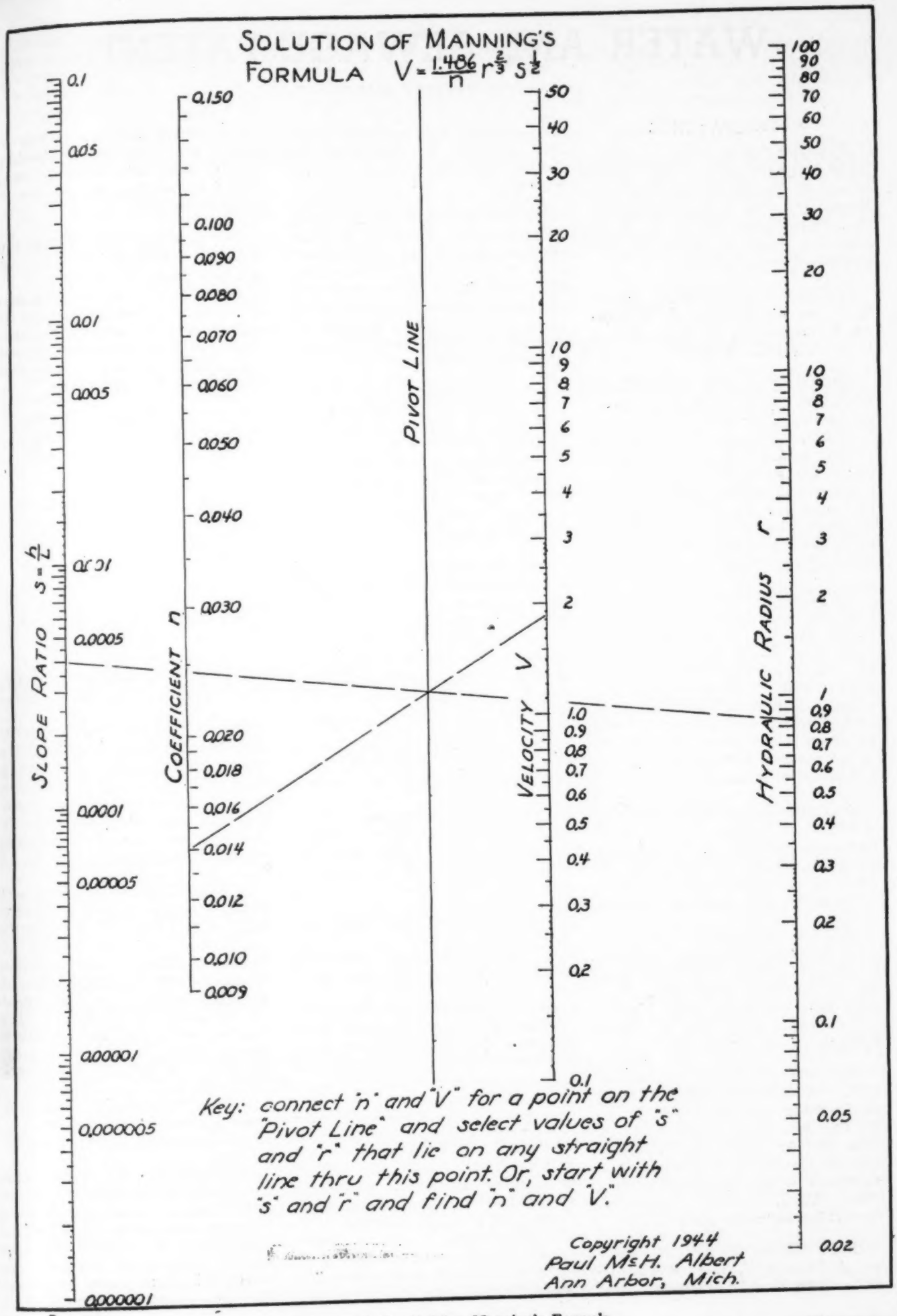
By PAUL McH. ALBERT
SHOECRAFT, DRURY AND McNAMEE, ENGRS.
ANN ARBOR, MICH.

THE accompanying nomographic chart presents a simple, rapid, and practical means of solving Manning's Formula for the flow of water in pipes and open channels.

Snap analysis of problems involving this formula will be more accurate and quicker when using this nomograph inasmuch as only two or three motions are required to arrive at an answer.

If the problem entails considerable study, many different solutions may be rapidly tabulated. The effect of the coefficient "n" on the other variables as determined from the nomograph is a valuable aid for the entire range is included.

For use in checking previous designs this chart will be found to be valuable and make possible rapid checks inasmuch as it covers a wide range of all the variables. Directions for using the nomograph are given in the key at the bottom of the chart.



Nomograph for Solving Manning's Formula

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

MANUFACTURE OF ALUMINUM SULPHATE PRODUCTS. Ritner W. Tomlinson and Henry G. Meyer (to the Pennsylvania Salt Co., Philadelphia, Pa.). U. S. 2,350,575. June 6. A continuous method of manufacture.

CENTRIFUGAL PUMP. Ralph R. Boyles and Edward A. Wilhelm (to Waterous Co., St. Paul, Minn.). U. S. 2,350,983. June 13.

APPARATUS FOR PURIFYING LIQUIDS. Fred F. Klett (to Moritz Gaetner, New York, N. Y). U. S. 2,351,053. June 13. A casing and vertical means therein to produce a ribbon-like flow channel with upper and lower chambers, means for introducing the liquid and removing the impurities which are retained in lower portion, while purified liquid is withdrawn from the top.

WATER PURIFICATION APPARATUS. David J. Evans (to E. C. D., Ltd., Tonbridge, Kent, England). U. S. 2,351,113. June 13. An apparatus consisting of a hand driven pump and electric generator, electrolytic cell, chemical tank, suction and discharge with necessary connections to pass the water through the electrolytic cell and chemical tank.

METHOD OF CONDITIONING WATER. Charles T. Fuetterer, Cuyahoga Falls, O. U. S. 2,351,259. June 13. Water softening by the addition of a softening agent in combination with a colloidal protein.

FILTER UNDERDRAIN. Edward W. Welp (to Graver Tank Co., Chicago, Ill.). U. S. 2,351,308. June 13. Cylindrical wood-stave filter with false bottom of steel containing numerous holes, and a conduit beneath.

METHOD AND APPARATUS FOR PROPORTIONING. Arnold O. Beckman (to Nat. Tech. Labs., So. Pasadena, Cal.). U. S. 2,351,579. June 20. An apparatus for proportioning a solution in a liquid in a receptacle as the liquid level therein rises. U. S. 2,351,580. June 20. Apparatus for same purpose.

UNDERGROUND PIPING. Howard A. Starret, U. S. Army. 2,351,642. June 20. An expansion joint for protecting fluid conducting pipe from damage by explosions and shocks comprising a special U-shaped section.

HYDROGEN ION EXCHANGE APPARATUS. Fred W. Whitlock (to Automatic Pump and Softener Corp., Rockford, Ill.). U. S. 2,351,648. June 20. A zeolite water softening apparatus in combination with an electric cell which operates regeneration system when water characteristics change.

WATER TREATING APPARATUS. Eric Pick (to Permutit Co., New York, N. Y.). U. S. 2,351,832. June 20. A water treating apparatus comprising a tank containing a bed of granular water treating material, with means for reversing flow and a rotary surface washer within the tank.

FILTER BED CLEANING. John B. Goldsborough (to Underpinning and Foundation Co., Inc., New York, N. Y.). U. S. 2,352,624. July 4. A cleaner adapted to travel over a granular filter bed with means for picking up and agitating sand so that dirt may be removed by a pump contained in the unit.

VALVE. Donald G. Griswold (to Clayton Mfg. Co., Alhambra, Cal.). U. S. 2,352,628. July 4.

FLUID DISTRIBUTION AND CONTROL APPARATUS. Donald G. Griswold (to Clayton Mfg. Co., Alhambra, Cal.). U. S. 2,352,629. July 4.

LIQUID LEVEL CONTROL APPARATUS. Donald G. Griswold (to Clayton Mfg. Co., Alhambra, Cal.). U. S. 2,352,630. July 4.

PIPE LINING APPARATUS. William R. Brend (to Lock Joint Pipe Co., East Orange, N. J.). U. S. 2,352,768. July 4. An apparatus for applying plastic material to the interior of a pipe.

METHOD FOR PREVENTING DEPOSITS WITHIN WATER FORMATIONS AND ON WELL SCREENS. Norris E. Gunderson (to Layne-Northern Co., Inc., Mishawaka, Ind.). U. S. 2,352,832. July 4. Introducing a reagent freely soluble in water and reactable with water constituents which form deposits, thereby preventing the deposition. Small amounts of the reagent are introduced annularly around well, the amounts being minor in relation to the flow of water to the well.

APPARATUS FOR TREATING WATER. William A. Klein (to Medford Engr. Co., Medford, N. J.). U. S. 2,352,901. July 4. A pressure filter with a contact aerator of broken lava in an upper portion above the filter and means for adding air and withdrawing same while maintaining the water level.

ROTARY PUMP. Walwin L. Davis (to Everett D. McCurdy, trustee, Cleveland, O.). U. S. 2,353,015. July 4.

FLUID PUMP. Ralph E. Hartline (to Mine Safety Appliances Co, Pittsburgh, Pa.). U. S. 2,353,031. July 4.

CLARIFICATION AND COOLING OF LIQUIDS. John J. Jackson (to Corning Glass Works, Corning, N. Y.). U. S. 2,353,038. July 4. An apparatus consisting of three chambers with means for moving liquid from one chamber to another.

PRECIPITATION AND COAGULATION. Frank D. Prager (to Graver Tank Co., Chicago, Ill.). U. S. 2,353,358. July 11. A tank containing two zones, one for coagulation and one concentric space for precipitation. Means of removing sludge precipitated is provided.

SOFTENING OF WATER AND FLOCCULATION OF SUSPENDED SOLIDS IN AQUEOUS LIQUIDS. John O. Samuel (to Unifloc Reagents, Ltd., Swansea, Wales). U. S. 2,354,146. July 18. A water softening process consisting of adding an amount of alkali together with a reagent made by mixing equal parts of Aluminum Sulphate ($12.H_2O$) and an alkali metal hydroxide at a temperature of 140 deg. C. and adding starch to the mixture at temperatures between room temperature and 140 deg. C.

OPERATION OF ANION-EXCHANGE UNITS. Robert J. Meyers and Donald S. Herr (to Resinous Products and Chem. Co., Philadelphia, Pa.). U. S. 2,354,172. July 18. A process of removing dissolved salt from water by passage through a cation exchange in its

hydrogen form and subsequent passage through an anion exchange in its basic form, with provision for its regeneration.

CHECK VALVE. Donald E. Gillum and Dale H. Van Riper; U. S. 2,354,255; July 25. A plastic check valve with a plastic ball within.

VALVE SHUTOFF DEVICE. John G. Fisher, Monrovia, Cal.; U. S. 2,354,366; July 25. A mechanical valve closer with timing gear, etc.

PUMP SYSTEM. Candido Jacuzzi, Berkley, Cal.; U. S. 2,354,811; Aug. 1. A pump with intake, discharge, and pressure tank as part of the pump system.

VALVE CONTROL SYSTEM. Edward P. Smith (to The Ohio Brass Co., Mansfield, O.); U. S. 2,354,888; Aug. 1. A remote control valve for a pipe line, with an electrically operated motor for operating the control valve and necessary electrical switch.

LIQUID TREATING APPARATUS AND PROCESS. Walter H. Green (to Infilco, Inc., Chicago, Ill.); U. S. 2,355,069; Aug. 8. Water treating apparatus with central zone in which rotates a mixing device. Sedimentation of precipitated solids is in an annular space from which some sludge is lifted to mix with the coagulated water, while excess sludge is removed.

COMBINATION WATER SOFTENER AND HEATER. William J. Towles (to himself and Donato F. Sisto, Los Angeles); U. S. 2,355,188; Aug. 8. A waterheater tank through which runs a flue, in inclined position, for heating and a large tube in which the softening occurs as the water is introduced into the heater compartment.

VALVE AND PIPE CONNECTION. Chris Wyss, Tillamook, Oreg.; U. S. 2,355,408; Aug. 8. A combined valve and fitting between a branch pipe and a main pipe including a nipple section connected at one end to the main pipe and having a valve normally closing and connection between the main pipe and nipple.

WATER TREATING APPARATUS. Merrill P. Robinson (to Worthington Pump and Machinery Corp.); U. S. 2,355,561; Aug. 8. A water treating apparatus consisting of a precipitation tank (with inlet for untreated and outlet for treated water), means for delivering water to the tank, meter for measuring the water delivered, and meter for measuring water and controlling valves to tank according to flow of water through the meter.

WATER TREATING APPARATUS. Joseph F. Sebald (to Worthington Pump and Machinery Corp.); U. S. 2,355,564; Aug. 8. A water treating apparatus in which chemicals are added to a Venturi tube which controls the flow of water into the tank, precipitation and sedimentation occurring in the tank with the settled slurry being partially removed but partially returned to the Venturi to mix with incoming water and chemicals.

WATER PUMP. Jesse M. Benson, Concord, Tenn.; U. S. 2,355,698; Aug. 15. A vertical reciprocating well pump actuated by a ratchet arm.

REMOVAL OF MANGANESE FROM WATER. Joseph P. Lawlor, Ames, Ia.; U. S. 2,355,808; Aug. 15. A pressure filter containing a layer of sand uncoated and a layer of sand coated with manganese dioxide, through which is passed water containing a manganese compound to coat the uncoated sand grains.

FLUID CONDITIONING APPARATUS. Chester T. McGill, Elgin, Ill.; U. S. 2,355,815; Aug. 15. An upward flow tank containing a water conditioning material and having takeoffs to allow drainage of bed to any predetermined point.

SELF CLOSING VALVE. Lyndus E. Harper (to Omega Machine Co., Kansas City, Mo.); U. S. 2,355,862; Aug. 15. Valve body in combination with a concave valve body seat, and passage thereto and a valve member having a compressible portion mounted between body portions, and a single means for simultaneously clamping the whole apparatus together.

SEWAGE PATENTS

LIQUID CLARIFICATION APPARATUS. Anthony J. Fischer and William C. Weber (to Dorr Co., New York, N. Y.); U. S. 2,335,640; Aug. 15. A liquid-holding settling tank having a partial partition dividing the tank into functionally separate primary and secondary compartments that are in constant hydraulic communication through the partial partition. Means of distributing liquid to primary compartment, and means for removing the supernatant liquid from each compartment, with a sludge removal system for both compartments discharging into a sump in the primary compartment.

METHOD OF AND APPARATUS FOR CLARIFYING LIQUIDS. Franklin P. Lasseter (to Dorr Co., New York, N. Y.); U. S. 2,355,875; Aug. 15. A vertical multiple tray ("multray") clarifier, with sedimentation occurring in each of several superimposed compartments into which the liquid is fed simultaneously by gravitational flow from a common source, with clarified liquid overflow from each compartment and sludge likewise removed from each compartment.

Activated Sludge Plant Recommended for "Home of the Angels"

In a report by Metcalf and Eddy, Engineers of Boston, it was recently recommended that the city of Los Angeles construct a sewage plant of the activated sludge type and outfall sewer at a cost of $21,000,000. The designed capacity of the plant will be 3,000,000 persons, with a proposed additional capacity in another plant to handle the business district of 1,000,000 persons. This second plant is, however, not proposed for immediate construction but some time after 1955 when the capacity of the first plant will be reached. Discharge of the effluent from the plant through an outfall terminating one mile offshore will eliminate the serious pollution of the bathing beaches, a condition that has existed for some time.

Sewer Rental Charges Adopted at Cleveland

Effective July 1, the city of Cleveland, O., adopted sewer rentals based on the quantity of metered water used by a consumer's premises. The charge of 18 cents per thousand cubic feet of water is payable on a quarterly basis at the same time and place as are the water bills.

A minimum quarterly charge of 18 cents has been established and provision has been made to charge for industrial wastes at the domestic sewage rate. The ordinance provides that sewer rentals unpaid for more than thirty days prior to July 1, each year will be assessed as tax charges against the property.

Proceeds from the sewer rentals will be kept in a separate "Sewer Rental Fund," from which appropriations may be made for the management, maintenance, and operation of the sewerage system, sewage pumping stations, and sewage disposal works. Cleveland has three sewage plants, the Easterly, the Southerly, and the Westerly.

The Editor's Comments

Depend on Your "Friends at Court" in Washington

WORD reached the Water and Sewage Division of the W.P.B.—but only indirectly, rather than directly as should have been the case—that, because of a shortage in lime production, the supply of lime to certain water and sewage plants had been arbitrarily cut as the result of orders from the Chemicals Div. of W.P.B. to lime producers.

Investigation by the Water Division revealed this to be the case, and certain large and very important water softening plants were to suffer the consequences of a deficient lime supply—the order setting the mandatory cut at 25% of normal usage. Apparently this considerable cut was ordered without regard as to effect and without first investigating to learn what real harm might result other than the "use of a little more soap," according to those of the Chemical Division who decided that "the public could put up with it during the emergency."

The *phenomenal* situation to us was the fact that the Chemical Division had acted arbitrarily in this matter, without even inquiring of W.P.B.'s own experts in the Water and Sewage Division, nor had the U. S. Public Health Service been asked for an opinion as to any possible effects lime dosage reductions might have on water purification and sewage treatment.

And, the *surprising* situation was that the water plant managers affected by the cut had not notified the Water Division of the difficulties which would ensue upon the 25% reduction of lime dosage ordered. The same was true in connection with sewage treatment.

When word of these lime cuts reached the Water Div. of O.W.U. Director Gorman lost no time getting busy on the Washington end. At a conference arranged with representatives of the Chemicals Div., in which A. M. Rawn, Chief Consultant to the Sewage Div., and the writer sat, this matter was thoroughly discussed. Lime cuts to water or sewage plants was vigorously objected to, with supporting arguments and reasoning which convinced the Chemicals Div. that any attempts at curtailment of water and sewage works chemicals should never be considered before first investigating to determine what the major consequences might be. Supporting objection came also from the U. S. Public Health Service, the A.W.W.A. and the Sewage Works Federation.

The major objective accomplished through the conference, we hope, was that of impressing upon the Chemicals Div. of W.P.B. that tampering with water and sewage treatment might prove disastrous to some war effort, as well as the public health, and should not be considered without careful analysis in advance. Of course, the lime cut order has been rescinded for water and sewage treatment.

This story is being told not alone to show that water and sewage works authorities have "friends at court" in Washington, but also to express astonishment that this is not more universally recognized and that they were not called upon promptly for assistance in this instance; and to say that in the future, if it's water supply that is affected by any Federal agency order, file a record with Arthur E. Gorman, Director, Water Div., O.W.U. Temporary Bldg. "R," Washington. If it's sewage disposal file with H. M. Evans, Chief, or A. M. Rawn, Chief Consultant, Sewage Section, Gov't Div. W.P.B., Social Security Bldg., Washington.

These are your "friends at court" in Washington, and never lose sight of the help that they are ever ready to give in all matters affecting water and sewage service to the Nation.

Blueprinting for Beautification

The attractive package not only sells the product, but also the producer.

This will not be the first time that readers of *Water Works and Sewerage* have heard us plead for more attention to plant beautification. First and foremost, it strikes us as representing good business to have the public impressed with the appearance of utility structures—in particular water works structures and properties.

To the observant reader we hardly need point out that sewage treatment plants are, in many instances, putting the local water plant to shame in so far as appearances are concerned. And, we can make the same statement with respect to the City Hall and other public buildings in many instances. This hardly seems right, and we believe that something should be done about the water works in particular.

We believe that the public should have high regard for, and confidence in, the community water works; and we feel convinced that the best start toward securing such regard is that of making the structures and properties impressive and attractive from the standpoint of neat and cleanly appearance first, but also some added beautification.

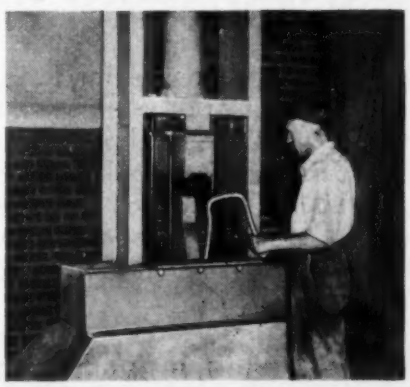
We don't know that a planning program of plant beautification could be termed blueprinting but the general idea of such "blueprinting" in producing post-war projects has a strong appeal. This idea is not ours alone, for we already know that some cities are planning for major beautification of utility properties, and public buildings and grounds generally, as post-war projects. Worcester, Mass., is one city which is placing considerable emphasis on post-war beautification projects.

The most effective method of selling a man a new hat is the sign in the hat display window that suggestively says—"Look at your hat!" Now, if a plant superintendent wishes to secure plant beautification in his "blueprint now" plans perhaps he can sell the mayor and commissioners the idea by showing them some pictures of plants which have appeared in the water and sewage works magazines in the past year or so—then, take a look at the hometown plant.

L. H. Enslow

MAINTENANCE TIPS
FOR CORROSIVE SEWAGE SERVICES

If your manhole ladder steps are "letting you down"....try



Everyone apparently has his share of manhole ladder step problems, and there has been a lot of experimenting around to find a solution . . . in one or two instances, expensive alloys have even been utilized. Then some engineers remembered that back in the days when wrought iron was almost universally used, no undue trouble was experienced, and after trial discovered it was just as durable today.

The way that the District of Columbia solved a ladder step problem makes a very interesting story, and may provide a helpful tip for you. Ordinary material, which depended on galvanizing for corrosion resistance, was previously used. The steps were formed by local heating of the bending zone, and hammering around in a vice. This was a slow process and one that resulted in considerable breakage and often left unrelieved stresses that contributed to early failure.

When spelter became critical, the engineers looked around for another material . . . and tried wrought iron. Bar stock, 5/8-in. square, was cut to length and shaped in a shop-constructed forming press. The piston was taken from a clamshell bucket of a dredge and operated by shop compressed air. Two rollers were incorporated in the upper die to avoid pulling the metal. Steps were formed completely in one operation, with no breakage difficulties. Several thousand can be produced per day when needed.

The unusual resistance of wrought iron to sewer gases and to the dank, moisture-laden atmosphere encountered in almost all underground tunnels, is the direct result of its unique structure. Wrought iron consists of a body of high-purity iron through which tiny fibers of glass-like silica slag are threaded. These threads of "iron-glass" act to prevent the pitting that causes premature weakening and failure of ordinary materials. They halt and deflect corrosive attack and also anchor the initial protective scale that shields the underlying metal.

If you have a step problem, we can arrange to show you a Service-Gram on Wrought Iron for Manhole Ladder Steps. Our Engineering Service Department will also be glad to give you any information you desire on present applications and performance of the material. Don't hesitate to write.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

Corrosion costs you more than Wrought Iron

90 years
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ALL SHAPES AND SIZES

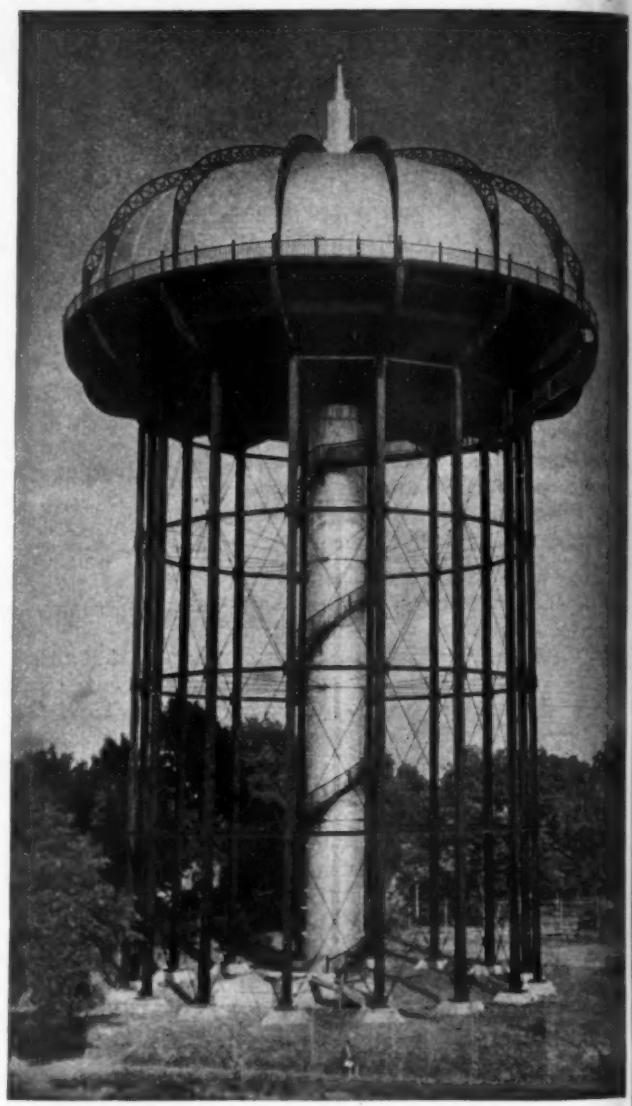
The R. D. Cole Mfg. Co. has developed a complete line of elevated steel tanks for water supply, both for domestic service, and sprinkler requirements, ranging in capacity from 5,000 to 2,000,000 gallons. The designs include the standard Hemispherical and Self-supporting bottom, the "Cole Ovaloid", Standpipe, and many individual styles involving architectural treatment to satisfy local conditions, or to provide special shapes for advertising purposes.

STORAGE TANKS

Pressure tanks for storage of gas from digesters at sewage disposal plants so that excess output at peak loads can be used during off-peak periods. Chemical storage tanks, hot water storage tanks, tanks for bulk storage of oils and gas.

CONSTRUCTION FACILITIES

Fabricated steel plate—the R. D. Cole Mfg. Co. has a fully equipped plant for the fabrication of riveted or welded steel plate. In addition to the construction of its regular line of horizontal return tubular boilers, oil storage tanks, tubular heaters, etc., the company is prepared to construct special tanks and apparatus of any specified metal plate.



1,000,000-Gallon "Cole-Shallow Depth" Tank

Designs available for any service, made to your specifications or from our designs submitted by our own Engineering Department.

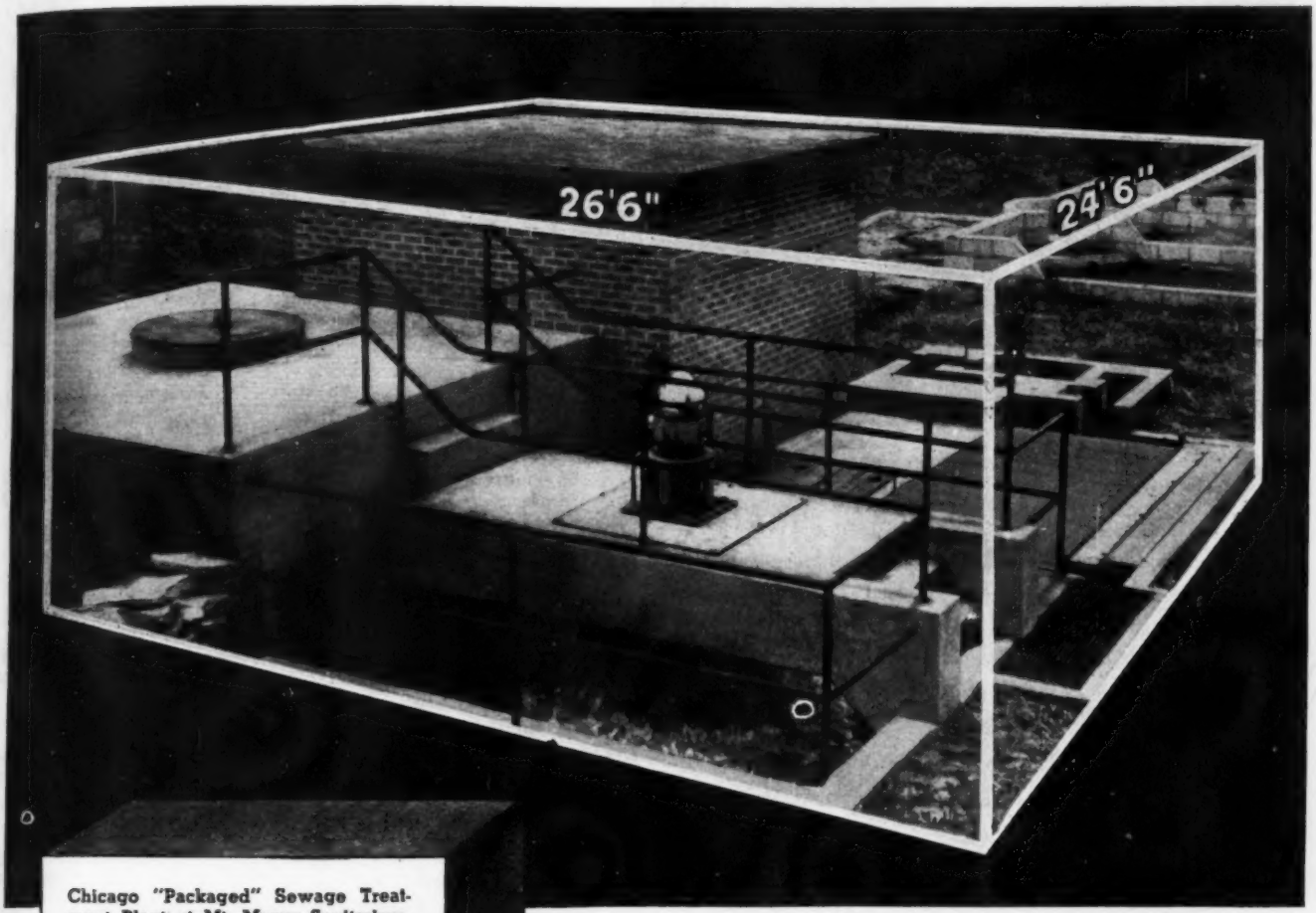
R. D. COLE MANUFACTURING CO.

Established in 1854

NEWNAN « « GEORGIA

Compact AS A PACKAGE

CHICAGO "PACKAGE" SEWAGE TREATMENT PLANTS FOR SMALL COMMUNITIES



Chicago "Packaged" Sewage Treatment Plant at Mt. Mercy Sanitarium, Dyer, Ind. Design Capacity, 20,000 GPD. The stationary engineer of the sanitarium also operates the sewage treatment plant. The plant is composed of a Comminutor, primary tank, Combination Aerator-Clarifier, pump house, digester and sludge beds.

OVER 100 SUCCESSFUL INSTALLATIONS PROVIDING COMPLETE TREATMENT

MUNICIPALITIES, AIRPORTS, HOUSING PROJECTS, INSTITUTIONS, WAR PLANTS, ARMY CAMPS, NAVY BASES

Complete treatment — Crystal clear effluent — Trouble-free performance — Simple operation by local man — Majority of plants close to residences — No odors and no flies — Space saving — Low cost — Gives small community same benefits of Activated Sludge Process as large cities.

Write for full description and discussion, facts and figures for this type of plant, which has been specifically developed for the characteristic small community sewage flow and strength.

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Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

WATER MAGIC!

The cleansing and purifying powers of SOLVAY Liquid Chlorine are almost magical! Treat germ-ladened, dirtied water with this orange liquid and—presto! water is made safe and sanitary for drinking and other uses.

The "water magic" of this effective chlorine bactericide is safe-guarding the health of our soldiers by "washing out" impurities, foul tastes, and odors from water supply units. On the home front, municipal water works systems purify drinking water and safely dispose of sewage wastes with SOLVAY Liquid Chlorine.

Today, SOLVAY Liquid Chlorine safeguards the health of a nation and its fighters with "water magic." Tomorrow, the powers of this orange liquid will serve municipalities and industries with the benefits of war-time applications of this effective bactericide.

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Alkalies and Chemical Products Manufactured by The Solvay Process Company

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LIQUID CHLORINE

MEETINGS SCHEDULED:

Sept. 24-27—St. Paul Minn. (Hotel St. Paul).
American Public Works Congress. (Annual Meeting). Executive Director, Frederic Bass, 1313 East 60th St., Chicago, Ill.

Oct. 3-5—New York, N. Y. (Hotel Pennsylvania).
American Public Health Association. (2nd Wartime Conference.) Chairman, Reginald M. Atwater, M.D., 1790 Broadway, New York, N. Y.

Oct. 5-7—Atlanta, Ga. (Atlanta Municipal Auditorium).
George Water & Sewage School. (13th Annual Meeting.) Sec'y-Treas., Van P. Enloe, Box 303, Atlanta, Ga.

Oct. 10—Bangor, Me.
Maine Utilities Association (Annual Meeting). Sec'y-Treas., Earle A. Tarr, Winthrop, Me.

Oct. 12-14—Pittsburgh, Pa. (Hotel William Penn).
Federation of Sewage Works Associations, Exec. Sec'y, W. H. Wisely, Illinois Building, Champaign, Ill.

and

Penna. Sewage Works Association. Sec'y-Treas., Bernard S. Bush, Kirby Health Center, Wilkes-Barre, Pa. (Joint Meeting with Fed. Sew. Wks. Assns.)

Oct. 17-19—Austin, Texas (Hotels Austin & Driskill).
Southwest Section A.W.W.A. Sec'y-Treas., George J. Rohan, P. O. Dr. 449, Waco, Texas.

Oct. 23-24—Kansas City, Mo. (President Hotel).
Missouri Valley Section A.W.W.A. Sec'y-Treas., E. L. Waterman, 104 Engineering Hall, University of Iowa, Iowa City, Ia.

Oct. 24-26—Los Angeles, Calif. (Biltmore Hotel).
California Section A.W.W.A. Secretary, Blair I. Burnson, P.O. Box 720, Oakland 4, Calif.

Oct. 26-27—Parkersburg, W. Va. (Chancellor Hotel).
West Virginia Section A.W.W.A. Secretary, J. H. Harrington, Director, Div. of Sanitary Engineering, State Dept. of Health, Charleston 5, W. Va.

Oct. 30-31—Pittsburgh, Pa. (Hotel William Penn).
Engineers' Society of Western Pennsylvania. (Fifth Annual Water Conference). General Chairman, H. M. Olson, Hotel William Penn, Pittsburgh, Pa.

Nov. 2-3—Toronto, Ont., Can. (Royal York Hotel).
Canadian Institute on Sewage and Sanitation. Secretary, Dr. A. E. Berry, Parliament Bldgs., Toronto, Ont., Can.

No. 2-4—Atlantic City, N. Y. (Hotel Madison).
New Jersey Section A.W.W.A. Sec'y, C. B. Tygert, Dist. Mgr., Wallace & Tiernan, Inc., Box 178, Newark, N. J.

Nov. 8-10 — Philadelphia, Pa. (Benjamin Franklin Hotel).
Four States Section A.W.W.A. Sec'y-Treas., H. Lloyd Nelson, U. S. Pipe & Foundry Co., Broad and Chestnut Sts., Philadelphia, Pa.

and

Penna. Water Works Operators' Assn. Sec'y-Treas., I. M. Glace, 22 South 22nd St., Harrisburg, Pa. (Second Joint Wartime Conference.)

Nov. 14-15—Richmond, Va. (John Marshall Hotel).
Virginia Section A.W.W.A. Secretary, W. H. Shewbridge, 119 State Office Bldg., Richmond, Va.

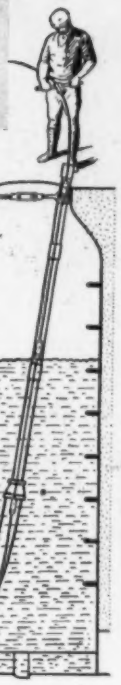
Nov. 14-15—Watertown, S. D. (Lincoln Hotel).
South Dakota Water & Sewage Works Conference. Sec'y-Treas., Glen J. Hopkins, State Board of Health, Pierre, S. D.
(This meeting, previously listed for Sept. 19-20 has been postponed to above date.)

Sections Not Holding Fall Meetings

Kentucky-Tennessee Section A.W.W.A.
New York Section A.W.W.A.
North Carolina Section A.W.W.A.
Pennsylvania Water Works Association.
*Western Pennsylvania Section A.W.W.A.
Wisconsin Section A.W.W.A.

*Previously listed but cancelled.

PLUG OFF THAT SEWER QUICKLY with a FLEXIBLE RUBBER PIPE PLUG



Here is another FLEXIBLE tool that will save you both time and money.

If you already have a line of FLEXIBLE equipment, all you need is the rubber pipe plug illustrated. Sewers and man-holes can quickly and easily be plugged off by the simple method illustrated.

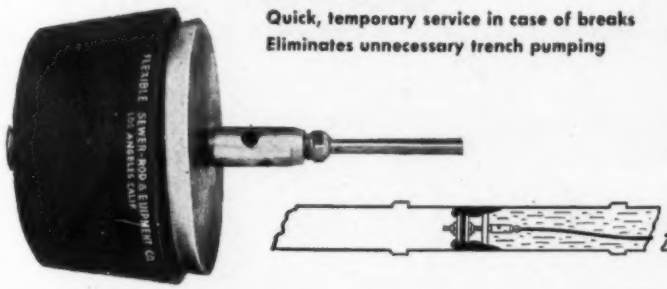
Ask for latest FLEXIBLE catalog containing complete instructions.

For Sewers:

Relining man-holes
Repairing broken pipe
Directing flow of disposal inlets
Plugging off house connections
Emergency flushing for sand

For Water Departments:

Quick, temporary service in case of breaks
Eliminates unnecessary trench pumping



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Hazleton Type "M"

CHECK VALVE

with Built-in Mercoid Motor Shut-off Switch for Automatic Pump Protection

PROTECTS PUMP FROM DAMAGE DUE TO LOSS OF WATER

PREVENTS OPERATION OF PUMP UNTIL PROPERLY PRIMED

The purpose of the flow switch is to insure pump against damage in the event that the pump loses its water during operation. The mercoid switch is actuated by the valve flap. Normally the switch is open when the flap is down. When the pump delivers water, the flow through the valve raises the flap and closes the switch. The mercoid switch is connected into the no-voltage coil of the motor starter.

When using a hand starter, the pump can be started up by hand, whether delivering water or not, but when the hand is removed from the starting lever, the pump will immediately stop unless the pump is delivering water and the mercoid switch of the check valve closed. With an automatic starter the "start" push button must be held in until the pump delivers water and closes the check valve switch.

Let us quote on your requirements

BARRETT, HAENTJENS & CO. - - Hazleton, Penna.

Sludge Fertilizer is Here to Stay

During the prewar period many sewage disposal plants found it profitable to convert their sludge into fertilizer with a Royer Sludge Disintegrator.

War's demand for greater food production has made the value of sludge fertilizer known to additional millions. The fertilizer produced by the Royer, with a minimum of labor, has increased the crops of commercial growers and Victory gardeners in all parts of the nation. Sewage plant superintendents everywhere report a ready market for all the fertilizer they can turn out.

Sludge cake from the drying beds is shoveled into the hopper of this rugged, inexpensive machine which breaks up the sludge to pea size, thoroughly aerates and further dries it, at the same time eliminating trash. It automatically discharges onto pile or truck a valuable and marketable fertilizer. Some sewage plants mix chemicals with the sludge in the hopper to produce a high strength fertilizer. The labor required is less than that for the wasteful practices of burying or incinerating the sludge.

Royers are available in twelve stationary and portable models; electric motor, gasoline engine and belt-to-tractor driven. Write for "Sewage Sludge Utilization Datalog."

THE ROYER FOUNDRY & MACHINE CO.
170 PRINGLE ST., KINGSTON, PA.

PIONEERS IN THE SALVAGE OF SEWAGE SLUDGE

Here and There with Doc Symons

HERE are some of those House Organs we were telling you about last month. We shall add to and complete the list next month.

Metco News—
Metallizing Engr. Co., Long Island City, N. Y.
Monsanto Magazine—
Monsanto Chemical Co., St. Louis, Mo.
Mueller Record—
Mueller Co., Decatur, Ill.
Nickel Cast Iron News—
International Nickel Co., New York 5, N. Y.
Nickel Topics—
International Nickel Co., New York, N. Y.
Oxy-Acetylene Tips—
The Linde Air Products Co., New York 17, N. Y.
Pipe Progress—
Amer. Cast Iron Pipe Co., Birmingham, Ala.
Powerfax—
Elliott Co., Jeannette, Pa.
Rohm Haas Reporter—
Rohm & Haas Co., Pittsburgh, Pa.
Silicate P's & Q's—
Philadelphia Quartz Co., Philadelphia, Pa.
Sparling's Metrograms—
R. W. Sparling Co., Los Angeles, Cal.
Taste and Odor Control Journal—
Ind. Chem. Sales Div., W. Va. Pulp & Paper Co., New York, N. Y.
The Betz Indicator—
W. H. & L. D. Betz Co., Frankford, Philadelphia, Pa.
The Chemist Analyst—
J. T. Baker Chem. Co., Phillipsburg, N. J.
The Laboratory—
Fischer Scientific Co., Pittsburgh, Pa.
The Frontier—
Armour Research Foundation, Chicago, Ill.
The Pioneer—
Niagara Alkali Co., New York, N. Y.

Well, what do you know!! Sven Svenson, the man whose name Pullman clerks will not believe, and salesman extraordinary for U. S. Pipe Co., is now in Kansas City. Buffalo and Western N. Y. is saddened by his leaving. . . Robt. S. Phillips, formerly of Durham, N. C. Water Works and energetic secy. of the N. Car. Section, AWWA, is now at Ream Hospital, Palm Beach, Fla.; not as a patient but doing his duty as one of the San. Corps. . . Steve Kin is back at Camp Butner, Goldsboro, N. C., as Assoc. Engr. in charge of Water and Sewage, after finishing some special duty at Fort Bragg and elsewhere in the 4th Corps Area. . . Edwin A. Fisher, who was city engineer of Rochester, N. Y., way back when they built their water plant, recently celebrated

his 97th birthday; must be the good Rochester water. . . Col. Art. Morrill, USPHS (R), is in Addis Ababa until about Nov. 1. . . Maj. Tom Riddick, also USPHS (R), is on the move again; last heard from he was soon departing for Cairo, Egypt, and later possibly the Balkans as a part of AMG. . . The Old Maestro of Michigan, Jim Rumsey, has been controlling swimmers' itch in Michigan this past summer; goes into postwar planning with Milt Adams this fall. . . Fred Stuart has a couple of new ideas being built by "Nick" Carter of Hackensack; on demonstration now, and they're worth seeing.

* * *

We don't believe that the 3rd edition of Vic Ehlers' and Ernest Steel's book on Sanitation was ever reviewed in WW&S, but we'd like to say that if you are interested in that subject, the 3rd edition has been available since last year. Enlarged and revised, it contains everything except the 1942 Drinking Water Standards and from the criticism of those during the past year there will probably be a revision before the 4th edition of "Mun. and Rural Sanitation" is published.

* * *

John L. Hawkins, Supt. of Greenville, S. C., City Water Works, sent this one in: "Stenographer: 'Is water works all one word, two words, or do you spell it with a *hydrant* in the middle?'"

* * *

A letter from Lindy Harper, Pres. of Omega Machine, recounts how Rollie Leveque, Omega's Sales Mgr., got away to an early start from Kansas City for Providence where he will office henceforth; Ralph Baker, Genl. Mgr., left at the same time; each in his own car. Rollie had two flats before he left the curb and Baker had a leak in his gas pump and also drove away on a flat tire, refusing to believe the bystanders who yelled words to that effect after him. Despite the departure troubles the pair are now in Providence, and Lindy himself will soon leave his "house of a thousand gadgets" in K. C. to move to Chicago, while the Omega plant moves to Providence.

* * *

F. P. Fischer (W & T Cleveland Mgr.) who edits the Ohio Section News, estimates that there are a thousand (1000) potential AWWA members in the state. Having tripled the membership in six years (now 261) we wonder how long it will take Hayes Kuhns to sign up that thousand.

QUIMBY
These 5 new features assure longer life, increased efficiency
1. Double Helical Pumping and Timing Gears: Eliminate hydraulic thrust and assure smooth, quiet operation at relatively high speeds.
2. Timing Gears Located at Outboard End: Makes timing gears and thrust bearings more accessible without removing coupling.
3. Improved Supporting Feet Ribbed to Nozzles: Support heavy pipe loads without distortion of body
4. Heavy Duty Anti-Friction Bearings: Double row, angular contact ball bearings on outboard end, heavy duty roller bearings on inboard end.
5. Accessible and Interchangeable Parts: All parts easily removed from casing. Parts machined to close tolerances.
QUIMBY PUMPS
QUIMBY PUMP Division

This story won't keep any longer: It seems that a sales engineer with the unusual name of Smith, or Jones, or Brown, went to an Ohio Section Convention not too long ago. Without a room reservation he had to take what he could get and that turned out to be a room with five cots and two Murphy beds. He took it.

Next morning as he was leaving the room, an amazed passerby noted the six unoccupied beds and remarked, "Where is your harem?" To which our friend replied, "Oh, they'll be there tonight."

* * *

The day passed with meetings, followed by the banquet and some friendly conversation here and there and thus it was late when Mr. Jones or whatever his name was, returned to his room and let himself in. Scarcely five minutes later our hero's friends received a frantic telephone call saying "Come up to my room, something's happened." Thinking it a gag, the friends demurred but at last were convinced and went.

When they arrived at our hero's room, there he stood at the door while five girls lay on the cots, clutching the bedclothes to their chins, and a sixth was vainly endeavoring to shoo out Mr. Brown (or whatever his name was).

His harem apparently was on strike.

P.S. The hotel had put six army

LARGE DIAMETER PIPE and FITTINGS

Including 48"

These fittings are typical of Acipco's complete line of high quality Cast Iron Fittings, available in all sizes. Acipco Large Diameter Pipe are manufactured by the Mono-Cast Centrifugal Process.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALABAMA

Dallas - Houston - El Paso - Pittsburgh - Kansas City
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This HIGH SPEED FINISH Can Really "TAKE IT"!

HIGHLY resistant to the attacks of water, moisture, acid, alkali and weather conditions, McDougall-Butler Hardcote Finishes are suitable for inside and outside applications on wood or metal surfaces. Made of synthetic resins specially combined with tough, durable oils. Can be readily brushed or sprayed. Covers usually with one coat. Sets in 15 minutes; dries in 1 hour. Wide range of colors for general maintenance and equipment. Complete data on request.

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DRY IN ONE HOUR

HARDCOTE INDUSTRIAL Finishes

3 *Money, Time and Labor Saving Features of*

UNIVERSAL CAST IRON PIPE

Laid with Only Wrenches →

No Caulking Materials →

No Gaskets. No Bell Holes to Dig. →

For water supply, fire protection systems, sewage disposal systems, industrial, and irrigation. Flexible.

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Gentlemen: Send us information and catalog on UNIVERSAL CAST IRON PIPE.

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EARLE OPERATING MACHINERY IS...

Trouble-free!

Operating machinery for dams, locks, gates and bridge installations should be, above all, dependable and positive in action. Earle "oversize" construction and automatic lubrication reduces wear to a minimum and provides year after year service with little or no maintenance. Earle mechanisms are known as "trouble free" by water works, bridge and sewerage engineers who specify them. Request bulletin 42B. The Earle Gear & Machine Co., 4725 Stenton Ave., Phila. 44, Pa.

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EARLE GEARS

To the Most Important Man in the Community

ARMY E NAVY

THERE is no one man more important to the health and safety of the community than the Water Works Official. Upon his shoulders rest the health and very life of every citizen. Yet if you stopped ten men, or twenty or a hundred and asked the name of this important individual, the chances are pretty great that not one would be able to answer.

Yet this very anonymity is silent praise of you and your work. Let there be but one breath of suspicion against the purity of the water supply and your name would be on everybody's lips.

In Hooker Chlorine you have a powerful protector of your anonymity. First in the field to produce chlorine electrolytically, Hooker has been providing high quality, high purity Liquid Chlorine to water works, filtration plants and sewerage systems for many years. The vigilance of water works officials plus the uniformly dependable supplies of Hooker Liquid Chlorine have helped to maintain the high sanitation standards of the United States.

Along with Hooker's production of Chlorine goes the offer of help on any of your problems involving the use of this chemical. Hooker's Technical Staff is continuously working with chlorine and their specialized knowledge is available to you in helping you overcome any difficulties that to-day's material and manpower shortages may cause.

HOOKER
ELECTROCHEMICAL COMPANY
Buffalo Ave. & Ward St.
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Chlorine *Bleaching Powder*
Caustic Soda *Ferric Chloride*

HOOKER CHEMICALS

The Sign of QUALITY!

VALVES
HYDRANTS
Need Regular
INSPECTION

All Gate Valves in water lines should be inspected at least twice per year, more often if possible. Most of these valves stay continuously in open position. Unless inspected, a valve might remain open for a number of years. Then in case of emergency, the valve might be found inoperative. An inspection should consist of opening and closing the valve several times to see that it is in perfect working order, and gland bolts should be tightened if there is any indication of leakage after inspection.

FIRE HYDRANTS

The above suggestions also apply to Fire Hydrants. In addition, Fire Hydrants should be flushed out at least twice per year to remove foreign matter that might collect, thus making the hydrant difficult to operate or might clog nozzle of fire hose.

M & H PRODUCTS INCLUDE

FIRE HYDRANTS	SHEAR GATES
GATE VALVES	MUD VALVES
TAPPING VALVES	VALVE BOXES
WALL CASTINGS	FLAP VALVES
SPECIAL CASTINGS	SLUDGE SHOES
TAPPING SLEEVES	FLANGE AND FLARE FITTINGS
CHECK VALVES	FLANGED FITTINGS
FLOOR STANDS	B & S FITTINGS
EXTENSION STEMS	CUTTING-IN TEES

M & H VALVE
AND FITTINGS COMPANY
ANNISTON, ALABAMA

SMITH
INSERTING VALVES

THE A.P. SMITH MFG. CO. EAST ORANGE, N.J.

NO SHUT-DOWNS NECESSARY!

Water shut-offs mean Industrial shut-downs, and this in turn impedes the war effort. These shut-offs are not necessary when a valve insertion is made.

Symbol of Quality Since 1889

With a Smith Valve Inserting Machine you can insert valves with the service at full pressure. These machines are made in 6 sizes for inserting 4" to 36" valves, are simple and easy to operate and do a surprisingly quick, clean job.

Showing a 24" valve installed horizontally under pressure.

OTHER SMITH PRODUCTS
Valves and Hydrants — Valve Inserting Machines — Tapping Sleeves — Tapping Valves — Hat Flanges and Water Meters
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THE A. P. SMITH MFG. CO., EAST ORANGE, N. J.

nurses in the room, moved our hero's clothes to next door and forgot to tell him about it.

[Well it's a good story, anyway, Doc.—Ed.]

* * *

Now that Eben Lufkin has joined the RedHed Mfg. Co. we wonder if he will continue to sell equipment the way we saw him doing once. We have a picture in our files labeled. "How to sell meters in Portland," in which Eben is playing cribbage in the meter room with Charles R. Moore, Asst. Engr. of the Portland Water District.

[Was there an "Empire" at stake?—Ed.]

We haven't forgotten yet how Duke Jackson of the Jackson Mich. sewage plant chairmaned the smoker at the Michigan Sewage Works Conference in Lansing last April. Before attending said smoker, Duke suggested that we and four or five including "Blueprint Now" Filby have dinner at the hotel. Imagine Duke's chagrin when we all arrived at the party to find *more* than enough to eat (at no cost) after having been the guests at dinner of Duke's boss, A. B. Cameron.—Incidentally we believe Jackson's sewage plant, noted for its park, is the only place where one can have duck soup, rabbit fricassee, and sludge cake, for in addition to the ducks on the park lake, A. B. and Duke now operate a rabbit warren.

* * *

Clarence Adams of New Albany, Ind., and Chairman of the Indiana Section told this story on his five-year-old son. The boy had just used the words "g— d—" (he didn't learn them from Clarence) and his mother had reprimanded saying that such language was impious, and irreverent, and that God would hear him. "Oh, no he won't and anyway how can he?" said the boy. To which the mother replied, "God is omnipresent." And young Adams said, "Oh, no, He is not Mr. Roosevelt."

MANUFACTURERS' and EQUIPMENT News

Stuart Walking-Beam Flocculator

Developed by Fred Stuart of Stuart-Brumley Co., Baltimore, and the Ralph B. Carter Co., Hackensack, N. J., a new type flocculating device is being offered for installation in coagulating basins, new or old.

Operating on an entirely different principle than the usual rotating blades, this flocculator has no underwater bearings, chains or moving drives. All driving parts are outside the basin, thereby eliminating underwater wear and lubrication problems. Power consumption is said to be a favorable consideration also. The device, named a Walking-Beam Flocculator, has tiers of inverted trough paddles suspended from the ends of walking beams which move the paddles up and down through about two feet, thereby creating the motion necessary to cause good flocculation.

The flocculating paddles, of which there are several hung from each end of the walking beams, are made of wood and are in reality inverted V troughs extending across the basin at right angles to the flow. The depth and angle of the V as well as the length of each side of the V and the distance of travel will depend on the size and style of the basin in which the device will be installed.

Vertical speed of travel of the floc-

culating V's is adjustable to conditions of coagulation, temperature of water and so forth. The actual action of the moving flocculating V's is unusual and differs from any motion produced by present-day flocculators. As one series of V-paddles moves up it drags with it a considerable volume of water beneath the inverted V, while the apex of the V pushes aside water above it. As the paddles move downward the water that has been moving up is pushed out from under the inverted V and rolls upward and around the edges of the V. The direction of the flocculators reverses as the walking-beam reverses, and while two or more go up the same number are going down in another part of the tank, the direction alternating from one to the next.

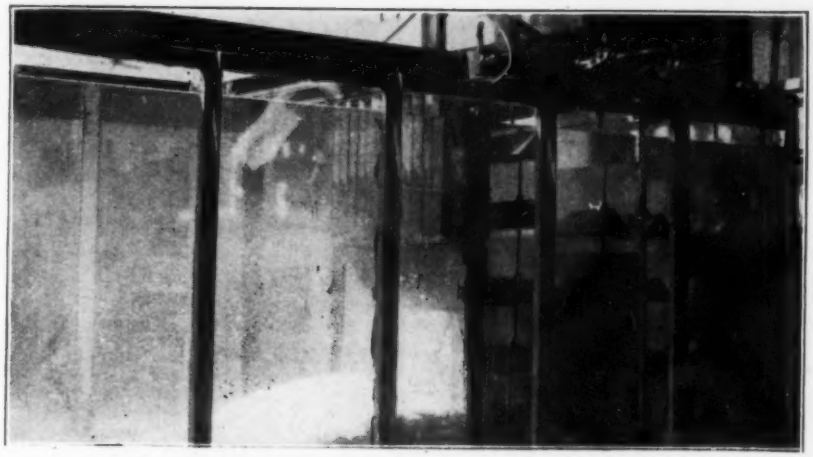
The action of this new flocculator has been demonstrated in an all glass pilot plant tank, in which, at a rate of 3 gpm. the coagulation time is approximately 25 min., followed by a settling time of 1½ hours. This all glass demonstration tank is operating at the Ralph B. Carter Co. plant in Hackensack, N. J., and arrangements to see the operation may be made either through the Stuart-Brumley Co. of Baltimore, Md., or the Carter Co. in Hackensack, N. J. Plans are now being drawn for the installation of two of these new type flocculators in two different water plants.

Unique Venturi Distributing Wall

Something new in the way of a baffle to distribute the flow of water or sewage into rectangular type settling basins has also been developed by Fred Stuart and the Ralph B. Carter Co. This device is an adjustable-multiple-venturi - flume-distributing-baffle.

Designed to occupy the upper third of a basin and distribute the flow of coagulated water evenly to the sedimentation basin this device has proved to function very effectively in the model pilot plant. The principle of the baffle is a series of venturi throats formed by shaped metal sheets which are hinged at the entrance end and arced in opposite directions. The area between two adjacent surfaces is thus a venturi flume extending the full depth of the baffle, and the cross section of the venturi throats may be varied by adjusting the curved sheets which constitute the sides.

Inasmuch as the flow of water bearing its load of flocced particles when it once enters the throat cannot back out, the water is forced



Working Model Stuart Flocculator and Venturi Distributor

300 GALLONS OF WATER
for every person in America

The combined daily productive capacity of the thousands of Peerless Deep Well Pumps is in excess of 36,000,000,000 gallons. This, figuratively speaking is enough water to supply every person in America with 300 gallons per day. The colossal production of water, pumped by Peerless, is distributed among countless fields—for city water services, on farms and ranches for irrigation and live stock, and in factories and plants for critical war uses,—wherever a dependable water supply is needed. Engineers and experienced pump users made exhaustive study before selecting these thousands of Peerless Pumps. Their judgment is your protection.

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corporation

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AUTOMATIC VALVES

ALTITUDE VALVES • SURGE • RELIEF • BACK PRESSURE VALVES
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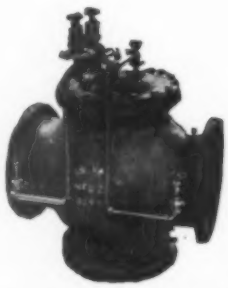
ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.



COMBINATION VALVE
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.

REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

"Blueprint Now!"

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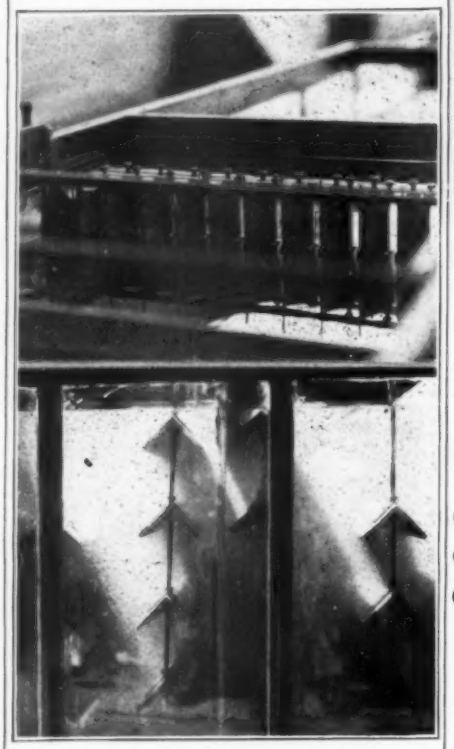
INCORPORATED
P. O. BOX 595, TROY, N. Y.

through. Squeezing up the throats causes the water to travel a further distance and thus deposit its flocs at a greater distance from the baffle wall.

The model pilot plant installation at Hackensack, N. J., has demonstrated amply that the multiple discharge actually gives a full distribution of flow over the whole cross-section of the baffled distributor. The



(*Lower Picture*)
Blades of Stuart Walking Beam Flocculator Snapped in Motion

(*Upper Picture*)
Water Section of Stuart Adjustable Venturi Throat Distributing Wall

accompanying picture indicates the rapidity of floc settling at basin entrance. Adjustability of the venturi throats appears to offer distinct advantages for distribution of the load of flocculated particles. Although the device has been designed for rectangular tanks, there appears to be no reason why it cannot be installed to good advantage in circular tanks receiving the influent at the center. While this multiple-adjustable venturi-flume distributing-baffle has been developed in water coagulating basins there is no reason why it should not find equal service in sewage treatment plants.

The pilot plant model in Hackensack, N. J., may be seen by arrangement either with the Stuart-Brumley Co. of Baltimore, Md., or the Ralph B. Carter Co. in Hackensack, N. J.

When You Specify
Meters and Recorders
Be Sure To Demand
• ACCURACY • RELIABILITY
• SOUND ENGINEERING
• MODERN APPEARANCE

Regardless of whether your problem calls for the use of a Venturi Tube, Weir, or Flume, you can depend on Bailey Meter Company to design and construct both the primary element and the register for maximum accuracy.

A vast amount of experience gained from thousands of installations of metering equipment, together with extensive experimental work in our own hydraulic laboratory and in the laboratories of the Ohio State University, Cornell University, Case School of Applied Science and other institutions, is back of every Bailey Primary Element.

The reliability of Bailey Meters and Recorders is attested to by the fact that thousands of dollars worth of steam and water are sold monthly and billed solely on the basis of readings from Bailey Meters.

No small share of the accuracy and reliability of Bailey Meters is due to the conservative engineering policy of the Company. New ideas and designs are not offered for sale until they have been thoroughly tested both in the laboratory and in actual service.

Bailey Meters, Recorders and Controllers present a thoroughly modern yet conservative appearance.

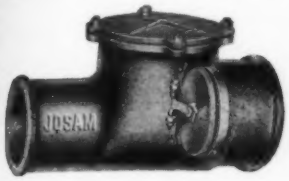
Write for your copy of Bulletins No. 301 and 302, describing Bailey Fluid Meters for steam, liquids, gases, sewage, sludge, and compressed air.

MU-10

BAILEY METER
• COMPANY •
1072 Ivanhoe Road, Cleveland, Ohio
BAILEY METER COMPANY LTD., MONTREAL

Side-Swing Sewer Check Valves

New sensitive, side swing backwater control valves, are being manufactured by the Josam Manuf. Co. of Cleveland. These Josam Sewer Valves are so constructed that with a side swing seat which revolves to prevent wear, back water from flooded sewers, rising tides, etc., can be prevented. Furnished in sizes from three to eight inches this device is constructed with a cast iron housing, it may be had with hub, flanged, or machine faced ends. Cleanout cover may be bolted or threaded, the flap is bronze and closes against a bronze seat. The inside of the valve is offset 5/8-in. to prevent fouling.



The side swing flap allows full water way when waste is flowing but closes at the slightest reversal of flow. The flap is normally open 3/4-in. but can be adjusted to a closed seat type if desired.

In addition to these new sewer valves the Josam Mfg. Co. has a number of drains with the side swing backwater feature. For further information on these novel valves request folder A.I.A. File No. 296. The address is Josam Manuf. Co., Empire Bldg., Cleveland, O.

Automatic Water Sampler

A new Automatic Water Sampler which collects water continuously and makes twelve two-hour composites each day has been invented by C. V. Swearingen, Chemist of the Chattanooga Water Works. The device designed in 1941 and subjected to trial and revision in the years since is manufactured by the Economy Manufacturing Co. of Chattanooga. Appearing to be a streamlined refrigerator, the apparatus may be used with ice or mechanical refrigeration. The essential parts of the sampler besides its provision for refrigeration of the samples when collected is the collection device. This consists of a turntable containing twelve sterilized sample bottles each of which in turn comes under the outlet which delivers a small portion of water from the supply line every few seconds. The new apparatus makes possible the collection of samples not only over a two-hour

He brings LARGE plant efficiency to SMALL sewage treatment plants

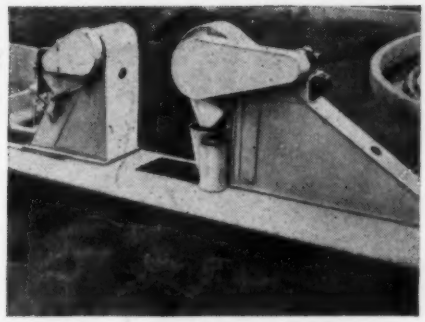
By designing small plant equipment to the same high quality standards that characterize his large plant installations, Rex Sanitation Engineering—Rex S. E.—has brought new efficiency and economy to the small sewage treatment plant.

For example, his "M.I." type mechanically cleaned bar screen is engineered specifically to give the small plant all the advantages in design and construction that are found in large plant units.

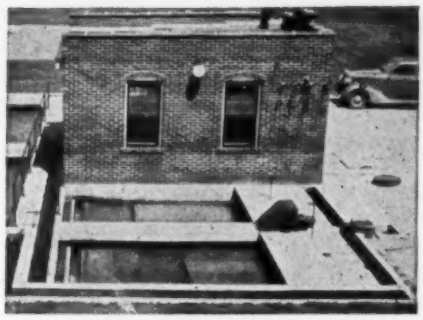
Rex S. E. manufactures a small type Conveyor Sludge Collector and Skimmer that is noted for its efficiency. His Grit Collector is a simple, ruggedly constructed unit that assures high efficiency and low operating costs for the smallest plant.

Rex S. E.'s Aero-Filter eliminates the need for excessive recirculation and oversize primary settling tanks . . . materially reduces the size and operating cost of the plant.

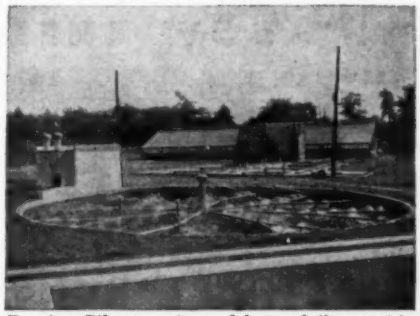
Rex S. E. and his staff of trained sanitation engineers can help you with your problems. For complete information, write Chain Belt Company, 1610 West Bruce Street, Milwaukee 4, Wisconsin.



Rex "M. I." mechanically cleaned bar screen and Rex Grit Collector.



Small primary settling tanks equipped with Rex Conveyor Sludge Collectors.



Rex Aero-Filter permits much larger daily capacities with smaller filter bed.

REX **SANITATION EQUIPMENT**

Triturators • Bar Screens • Tow-Bro Sludge Removers • Slo-Mixers Aero-Filters • Rapid Mixers • Grit and Sludge Collectors and Grit Washers

CHAIN BELT COMPANY OF MILWAUKEE

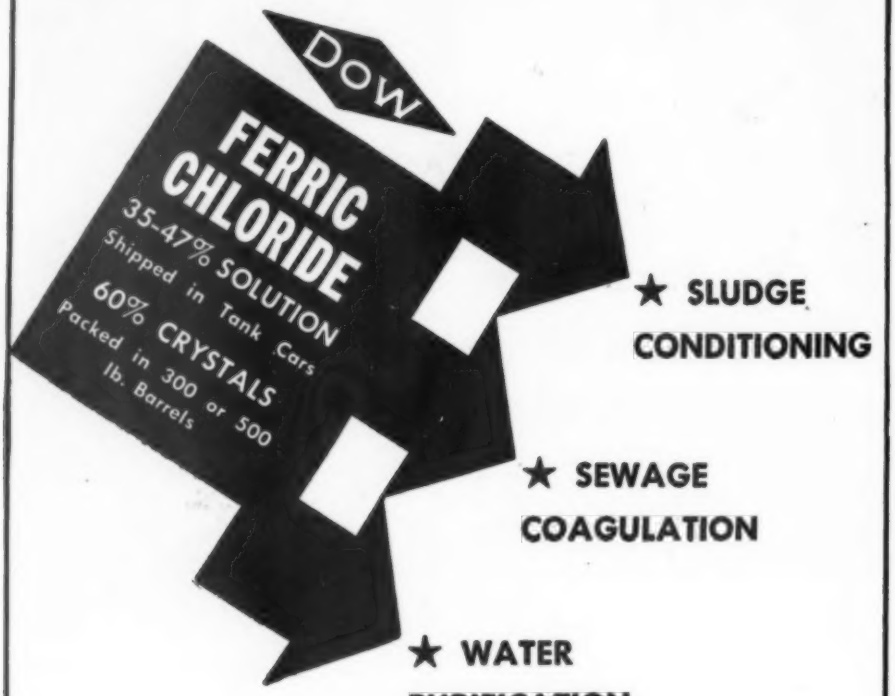
Member of the Water and Sewage Works Manufacturers Association, Inc.

INCINERATION ENGINEERS

NICHOLS ENGINEERING & RESEARCH CORPORATION

60 WALL TOWER NEW YORK, N. Y.

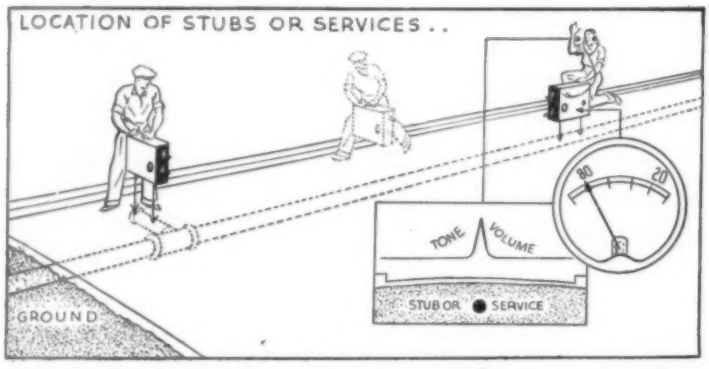
Consultants • Designers • Constructors



THE DOW CHEMICAL COMPANY
MIDLAND MICHIGAN

M-SCOPE

BURIED PIPE AND CABLE FINDER



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The M-Scope is solving—successfully—the varied problems involved in the development, operation and maintenance of buried pipe and cable systems and is in daily use by representative organizations in such important groups as:

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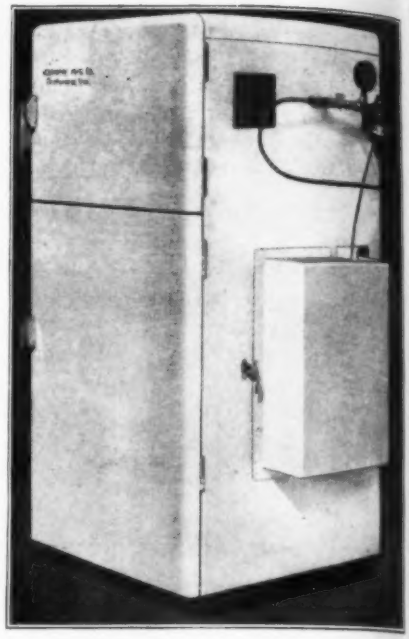


period but also during every two hour period in the day, or the collection may be for four or six hour periods. For further information on the automatic sampler, write to the Economy Manufacturing Co., P.O. Box 188, Chattanooga 1, Tenn.

Empire Streemline Meter Line Expanded

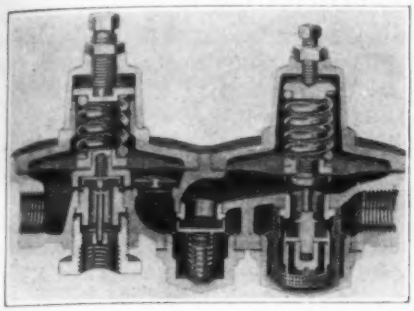
With the WPB Order permitting resumption of manufacture of water meters with bronze cases, the Pitts-

burgh Equitable Meter Co. announced that the line of Empire Streemline Meters has been expanded. These meters are now available in ⅝-in., ⅝x¾-in., ¾-in. and 1-in. to cover the complete range of do-

mestic services. Revised literature on the complete line (Bul. N-307) is available from Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh 8, Pa.

Birch Master Water Pressure Regulators

Birch Water pressure regulators and relief valves for hot water heating plants are especially designed for home and small building hot water heating and domestic service. These valves designed by the maker of the famed Birch Pump Valves will



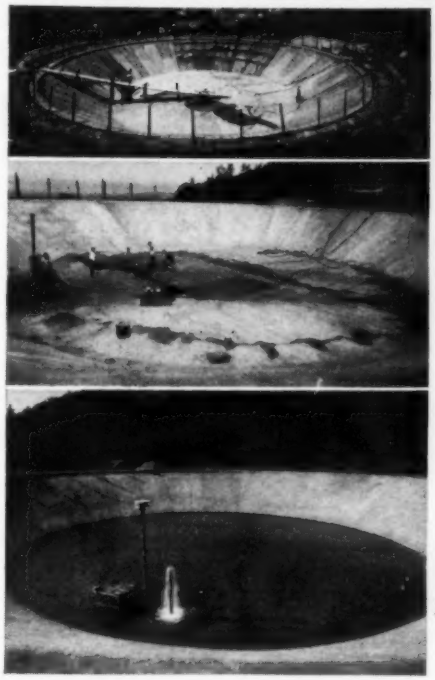
be available as soon as restrictions on bronze are lifted. Composed of two parts, one of which is a pressure regulator and the other of which is a relief valve, the unit is for use on hot water systems where the valve not only will control the pressure of the system but will absolutely prevent backing up of hot water into cold water lines, injuring meters and doing other damage. It will also prevent build up of pressure and possible rupture of water tanks, a condition that has in the past caused considerable personal and property damage.

The Birch Master Relief Valve is the only valve in which the seat and the relief compartment may be removed for cleaning without shutting down the plant. The valve will pass 8 gpm and is set to deliver water at 10 lb. pressure with the relief set at 40 lb. A companion valve is a relief valve which does not provide for pressure regulation. Information on these valves should be of interest to builders, plumbers, householders and water utilities. Such information may be obtained from the Birch Manufacturing Co., 1521-23 Sedgwick Street, Chicago, Ill.

New Yeomans Representative in Cincinnati

Announcement has been made by the Yeomans Brothers Co. of Chicago that the Engineering Equipment Co. of Cincinnati will represent them in the Cincinnati area. This area includes Indiana and the

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



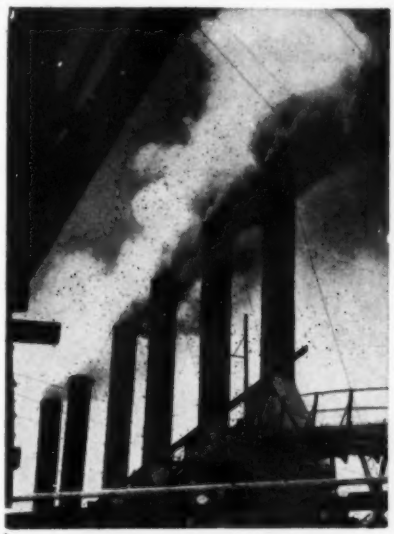
RESTORED WITH "GUNITE"—FOR GOOD!

This is an earth reservoir of the Village of Bristol, Vt. The original construction consisted of a thin concrete lining, with a great number of radial expansion joints. It did not last, and in 1934 the reservoir leaked excessively.

In that year we placed a new reinforced "GUNITE" lining, two inches thick, which corrected the difficulty and restored the reservoir for many years of useful service. The upper photo shows preparation for the work, at middle, the "GUNITE" is being applied (on bottom and sides), and at bottom, the reservoir is back on the job.

Our Bulletin 2200 shows similar operations and many other applications for "GUNITE." Ask us to send you a copy!

MANUFACTURERS OF THE "CEMENT GUN"



The Problem of PLANT OVERLOAD is solved economically with

ISCO FERRIC CHLORIDE

Ferri-Cl$_3$or
FERRIC CHLORIDE

the Modern and Efficient Coagulant

INNIS, SPEIDEN & COMPANY
Established 1816
117 Liberty Street . . . . . NEW YORK
CHICAGO • CLEVELAND • CINCINNATI
BOSTON • PHILADELPHIA • GLOVERSVILLE, N. Y.

It Pays to use HAYS *- It Stays . . .*

1869
CORPORATION STOP
(DRIVE PATTERN)

Since 1869 Hays has specialized in the manufacture of water works materials. Then, as now, quality, insuring dependability, was the foremost consideration. Then, as now, ultimate cost was of prime importance.

The annoyance, inconvenience, and expense of replacement can be avoided by using Hays in original installations. Yes, it pays to use Hays. It stays.

Be sure to replace the one you just dug up with another Hays Stop. Yes, in the old days I too used Hays . . . it pays . . . it stays.

1944
CORPORATION STOPS
YOUR CHOICE FOR COPPER OR LEAD PIPE

Do More Than Before—Buy EXTRA War Bonds

HAYS — OUR SEVENTY-FIFTH ANNIVERSARY

COPPER · BRASS · LEAD · IRON
WATER WORKS PRODUCTS
HAYS MANUFACTURING CO., ERIE, PA.

'BESTOLIFE

LEAD SEAL
JOINT SEALING
AND ANTI-SEIZE
PIPE JOINT COMPOUNDS

'BESTOLIFE Compounds have been used successfully for years in Water Works and Sewerage plants.

They obtain their effective anti-corrosion sealing characteristics from the metallic lead base of the compounds.

Use 'BESTOLIFE Compounds on water, oil, gas and gasoline lines; all threaded connections in valves, hydrants, pumps, engines, air compressors, etc., and on all studs and bolts. Also recommended for meter repairing.

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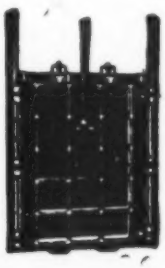
RODNEY HUNT



GATES and HOISTS

Metal or timber sluice gates of all sizes and designs, approved by engineers everywhere. Improved gate stands and hoists for hand or motor operation. Also flap and mud valves, shear and filler gates, trash racks and rakes. Dependable canal equipment from dam to tail-race since 1840.

Write for Special Catalog Today!

RODNEY HUNT

RODNEY HUNT MACHINE CO.
118 Lake St., Orange, Mass., U. S. A.

northern tier of Kentucky counties facing western Ohio in addition to Dearborn County. Mr. F. L. Holiday heads the firm which will distribute all Yeomans products, including pumps, compressors, and sewage treatment equipment.

Bowen Returns to Hill-Hubbell

The General Paint Corp. has announced that Milton M. Bowen, who has been on leave of absence to serve with the War Production Board, has returned to active duty as Vice President and Manager of the Hill, Hubbell & Co. Div. of the Corporation. Mr. Bowen has represented Hill, Hubbel & Co. since 1936 in the Middle West.

Kerr Made Genl. Sales Mgr. of PEMCO

Effective July 1, A. J. Kerr became General Sales Mgr. for the combined organizations of the Pittsburgh Equitable Meter Co. and Merco Nordstrom Valve Co. Mr. Kerr has been with the company for twenty years and was district manager of the midwest headquarters at Tulsa, Okla. prior to coming to the home office.

A. J. Kerr

Mr. Kerr's first official act as Gen. Sales Mgr. was to appoint M. D. Gil-

..for **ACCURACY** *and TROUBLE-FREE OPERATION*

INSIST ON THE
WILSON
PULSAFEEDER

Engineered and Manufactured by
WILSON
CHEMICAL FEEDERS, INC.
203 CLINTON STREET BUFFALO 4, N. Y.

bert as Dist. Mgr. of the Tulsa office, C. K. Madison as Dist. Mgr. of the Houston, Tex, office, and W. S. Andrews as Dist. Mgr. of the Pittsburgh office. Gilbert and Madison were service engineers in the midwest territory and Andrews, formerly a service engineer out of Pittsburgh, has more recently travelled out of the Cleveland Office.

Penn Salt News

The Pennsylvania Salt company has announced the organization of an export department at the company's main office in Philadelphia. Mr. John H. Barr has been appointed manager of the Export Dept., which will be devoted to sales in all Latin American countries including Cuba, Haiti, Jamaica, and Puerto Rico.

The company has also announced that Dr. William A. LaLande, Jr., formerly director of the Attapulgus Clay Co. has joined the Research and Development Department.

Pomona Pump Administration Moves to Main Hendy Plant

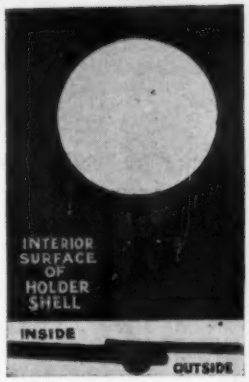
The chief administrative offices of the Pomona Pump Div. of the Joshua Hendy Iron Works have been moved to Sunnyvale, Cal., for a consolidation with the general administration of the company. Sales, engineering, purchasing, and accounting departments are being moved, but all manufacturing activities will continue to be carried on in the Southern California plants at Pomona and Torrance, under the direction of Charles L. Barrett as plant manager for both. Arnold Brown, sales mgr., A. W. Moore, advertising mgr., and Ralph Linderman, export mgr., will move their offices to Sunnyvale.

CONTRACTS
Completely Installed

Water Works and Sewerage Plant Equipment

Turbine Equipment Co.
75 West St.
New York 6, N. Y.

Don't Let NEGLECT Put Your Gas Holders Down!



CORROSION when neglected—can easily cut away one-half the life possibility of your sewage digester gas holders. Stacey Brothers have made a thorough study of the many problems relative to corrosion on gas holders. We have developed an Inspection Service that can bring to light the *hidden* facts on the condition of YOUR holders, and possibly save you hundreds and hundreds of dollars expense. Remember, CORROSION *never sleeps.*

Shown at right is a portion of a gas holder shell. The rivets appeared to be in good condition from the outside but Stacey Brothers Inspection Service revealed that rivet heads on *inside* of holder were almost completely gone! Write us TODAY—it may be the means of extending the usefulness of your holder many, many years.

Stacey Brothers

The STACEY BROS. *Gas Construction Co.*

Executive Office
5535 Vine St.
Cincinnati 16, Ohio

Eastern Office
21 West St.
New York 6, N. Y.

Gas Holder INSPECTION SERVICE

ENGINEERS • FABRICATORS • RECOGNIZED EXPERIENCE & FACILITIES

84" pipe—Spring Lake, N. J.

FLANGED PIPE
FLEXIBLE JOINT PIPE
BELL & SPIGOT PIPE
SPECIAL CASTINGS
SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

SIZES 1" TO 84"

Warren Foundry & Pipe Corp.
11 Broadway, New York

Warren Pipe Company of Mass., Inc.

LEADITE
The Pioneer Self-Caulking Material for C. I. Pipe

TABLE OF COMPARATIVE QUANTITIES

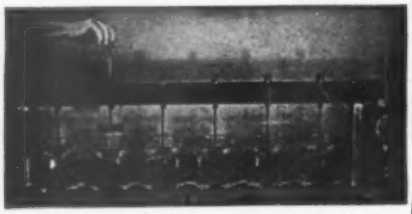
Nominal inside dia. of pipe, in.	Depth of Joint, Inches of Leadite	Approx. lbs. of Leadite per Joint	Depth of Joint, Inches of Lead	Approx. lbs. of Lead per Joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
48	3.50	30.00	3.00	121.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

STOP
JOINT LEAKAGE
WITH
CARSON CLAMPS
AND MECHANICAL JOINTS
Charcoal iron bolts for Cast Iron Pipe and Fittings.
Write for Prices.
Carson-Cadillac Co.
1221 PINSON ST. BIRMINGHAM, ALA.

THE Phipps & Bird
LABORATORY MIXER . . .



is the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.
PHIPPS & BIRD, INC. Richmond, Va.

LITERATURE AND CATALOGS

Worthington Axial-Flow and Mixed Flow Centrifugal Pumps is the title of Bull. W-313-B-2 of the Worthington Pump and Machinery Corp. "The catalog has been prepared to show the Propeller Pump and Mixed-Flow Volute Pump lines, the types of settings available, and the most suitable selection for a particular application." In the forty-seven pages comprising the catalog, are shown typical sections of nine pumps as well as numerous photographs of installations and equipment. Also included are flow curves and data required for the selection of the most suitable pump as well as "Useful engineering data for low and moderate head centrifugal pumps." Bull. W-313-B2 may be obtained from the Worthington Pump and Machinery Corp., Harrison, N. J.

Yeomans "Transporter," the pneumatic ejector of materials, is thoroughly described in Bull. 4500 of the Yeomans Brothers Co. of Chicago. The bulletin tells what the "Transporter" is, where it can be used, how it operates, the advantages of the equipment, suggested industrial applications, and suggested municipal uses. Among the latter are the transportation of sewage sludge, water treatment chemicals, garbage, sewage screenings. The bulletin also contains information on the Yeoman's series of famed pneumatic ejectors and the Yeomans Rotary Air Compressor. Bull 4500 may be obtained by addressing a request to Yeomans Brothers Co., 1433 N. Dayton St., Chicago 22, Ill.

Allis-Chalmers 1943 Annual Review, and preview, is the latest edition of this 88 page catalog which endeavors to record the significant Allis-Chalmers contribution to industrial progress in the past year. Prepared as it is in terms of the many industries that Allis-Chalmers serves, the book features seven sections, power generation, power distribution, processing, general industrial, construction and agriculture, transportation, and research. Although no section features equipment for water works and sewage disposal plants, there are illustrated a number of items that find use in these fields, as for example, centrifugal pumps, starting gear, switch gear, transformers, valves, blowers and compressors, sheaves, motors,

WRITE FOR INFORMATION
VOGT BROTHERS TRAFFIC MODEL FIRE HYDRANT

A.W.W.A.

VOGT BROTHERS MFG. CO. Incorporated LOUISVILLE, KY.
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VOGT MFG. CO., Incorporated LOUISVILLE, KY.
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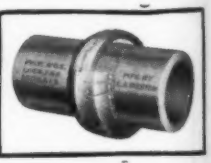
AERO-MIX AERATOR—MIXER
AERATOR—MIXER
A Size and Type to Fit Your Problem in Water or Sewage Treatment.

WRITE FOR INFORMATION

ANTHRAFILT
A Filter Medium For All Purposes
ANTHRACITE EQUIPMENT CORP.
101 Park Ave. New York
H. G. Turner Research Engineer
STATE COLLEGE, PA.

WESTON



GASKET AND FORM
The Perfected Method for Making
SEWER PIPE JOINTS OF CEMENT
- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON Adams, Mass.

Use BLACKALUM—and Deliver Better Water!

10 *Technical Advantages*

A MORE DEFINITELY DEFINED FLOC, due to the millions of highly absorptive carbon particles in the floc. (16% by volume, 4% by weight—phenol value 25.)

FASTER SETTLING FLOC caused by the additional weight of the carbon particles.

STABILIZATION OF SLUDGE. The organic impurities caught by the floc remain stable due to the carbon adsorption.

STABILIZATION OF FILTER SAND. Any floc which reaches the filter sand in stable like the sludge.

LONGER FILTER RUNS. Floc containing carbon particles is more granulated (less colloidal) than with ordinary alum coagulation.

REDUCED 20° BACTERIAL COUNT IN FILTERED WATER. A low 20° count means less putrefaction and liquefying action in the beds, therefore less chlorine demand after filtration. Also less tendency to taste production upon final chlorination.

LESS FREE RESIDUAL ALUM IN FINISHED WATER. A low residual alum content means less after-precipitation and less dead end trouble—indicates superior coagulation with more efficient organic matter removal.

CHLORINE DEMAND REDUCTION. Prechlorination residuals will penetrate further through a settling basin in which there are no gases of decomposition resulting from sludge putrefaction.

DECHLORINATION. The floc held in the filter bed contains sufficient activated carbon particles to dechlorinate the finished water.

TASTE AND ODOR IMPROVEMENT. With the use of Blackalum the plant is always seeded with activated carbon particles which absorb organic matter resulting in better tasting water.

Send us your trial order.

STUART-BRUMLEY CORP.

516 NORTH CHARLES STREET BALTIMORE, MARYLAND

Water Pressure Relief Valve

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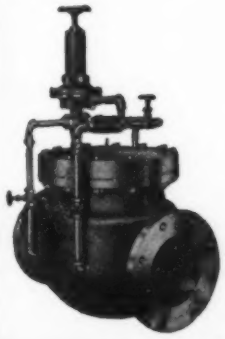
Valves may be arranged to open at abnormal pressures and held open under subnormal pressures until the surge subsides, and then close when normal conditions prevail.



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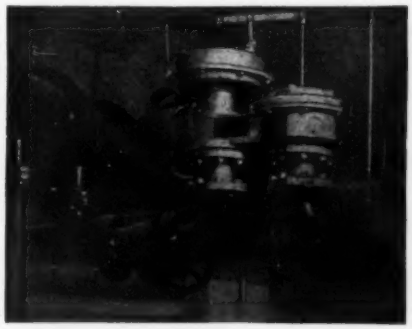

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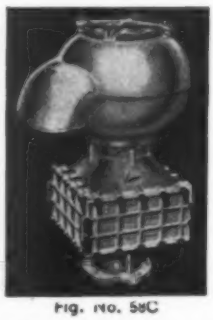

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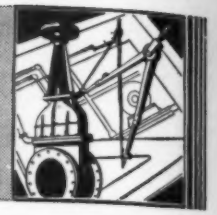

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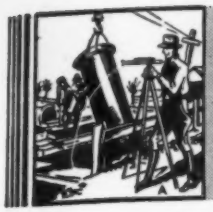

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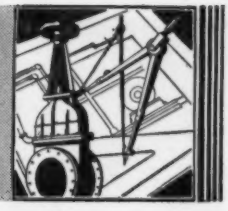

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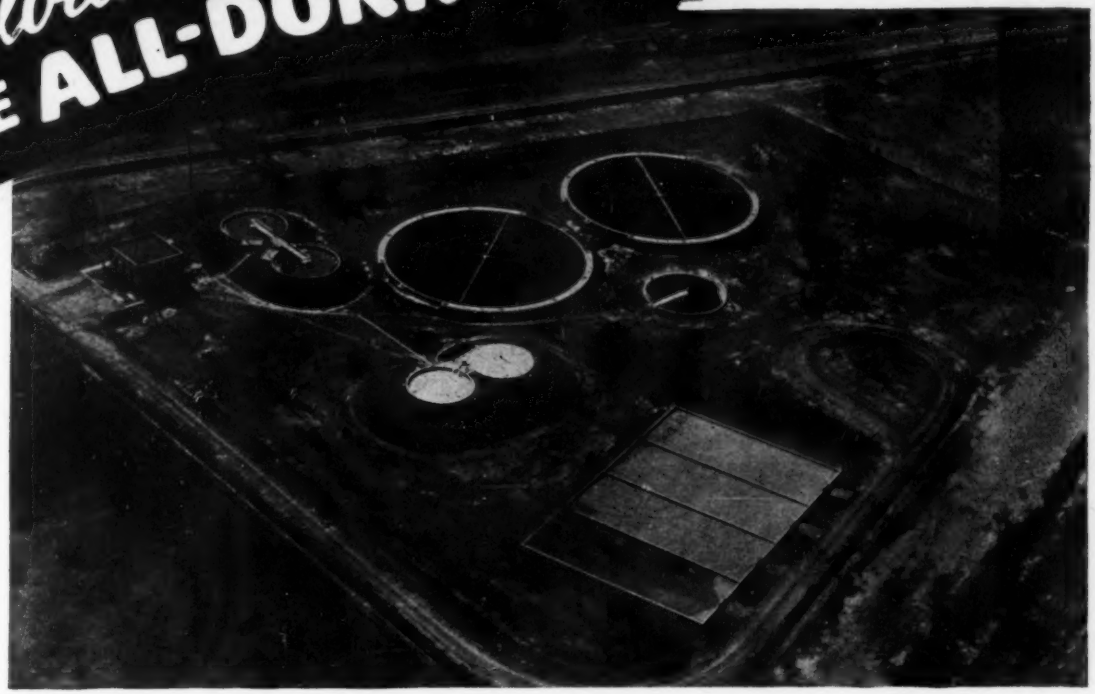

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The Dorr Field Engineering Service periodically inspects the equipment and keeps it functioning at top efficiency. The assistance of our experienced sanitary engineers is available at all times on plant operating problems. There is no chance for buck-passing in an All-Dorr Plant.

Blueprint Now! FOR TOMORROW'S NEEDS

● *Ask for a Dorr Engineer to help you with your post-war plans.*

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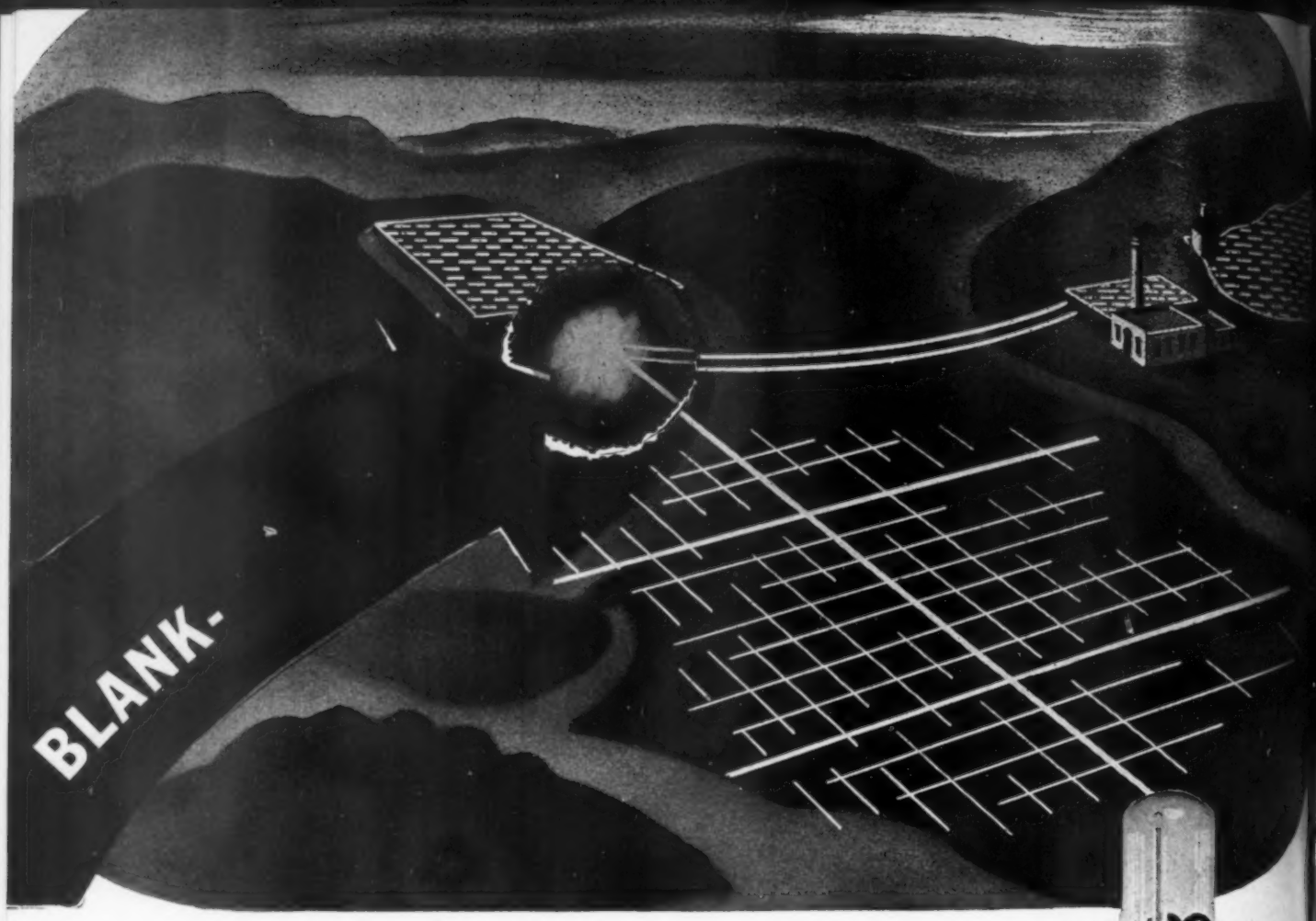

in the protection you get from **Chlorination** *?*

Even though your present Chlorinator installation *produces* a safe water at the treatment plant, can you be sure that this protection is *maintained* in distribution?

Many cities are now making plans to increase their safety-insurance against recontamination at distribution reservoirs, floating reservoirs or finished water storage basins.

Secondary chlorination at the reservoir outflow helps maintain a free chlorine residual throughout the distribution mains. W&T Chlorinators of the automatic-proportioning type, have the wide operating range and protection against flow reversal that's needed for this type of service.

Why not check with W&T engineers on ways and means for eliminating this "blank-spot" in 100% protection of water supplies?

"The Only Safe Water is a Sterilized Water"